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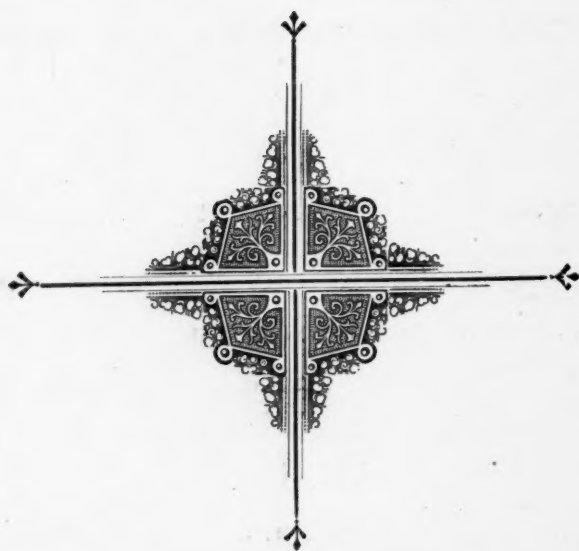
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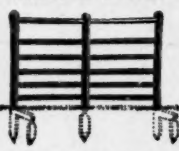

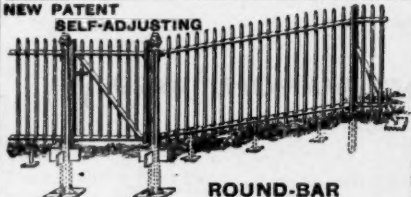
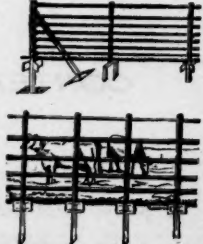

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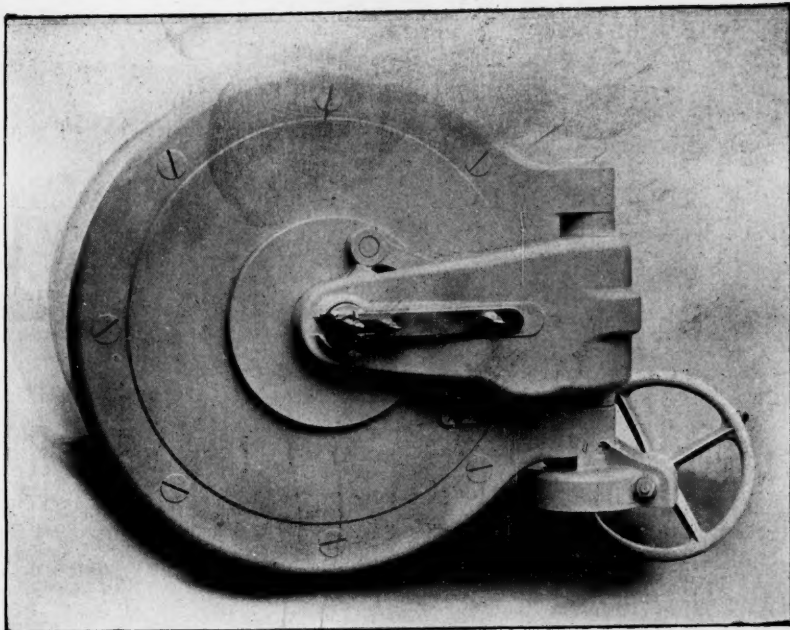
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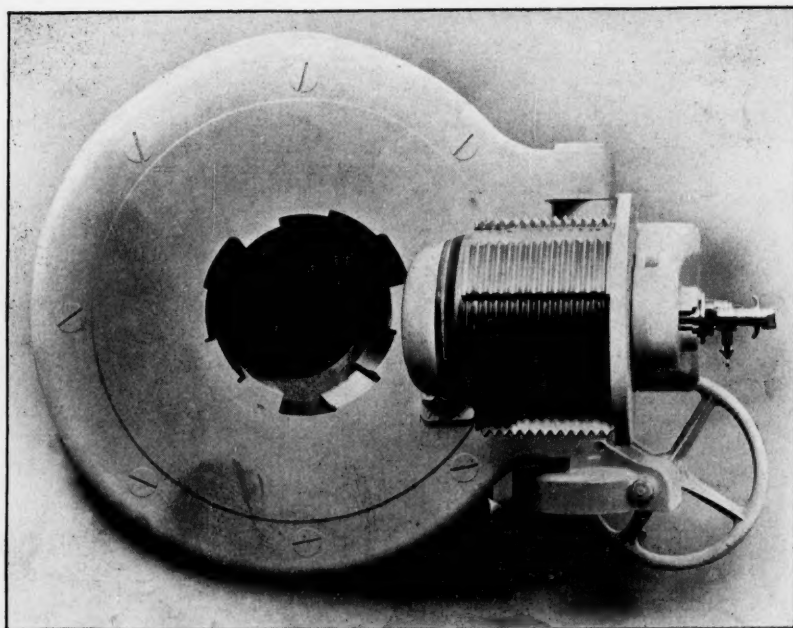
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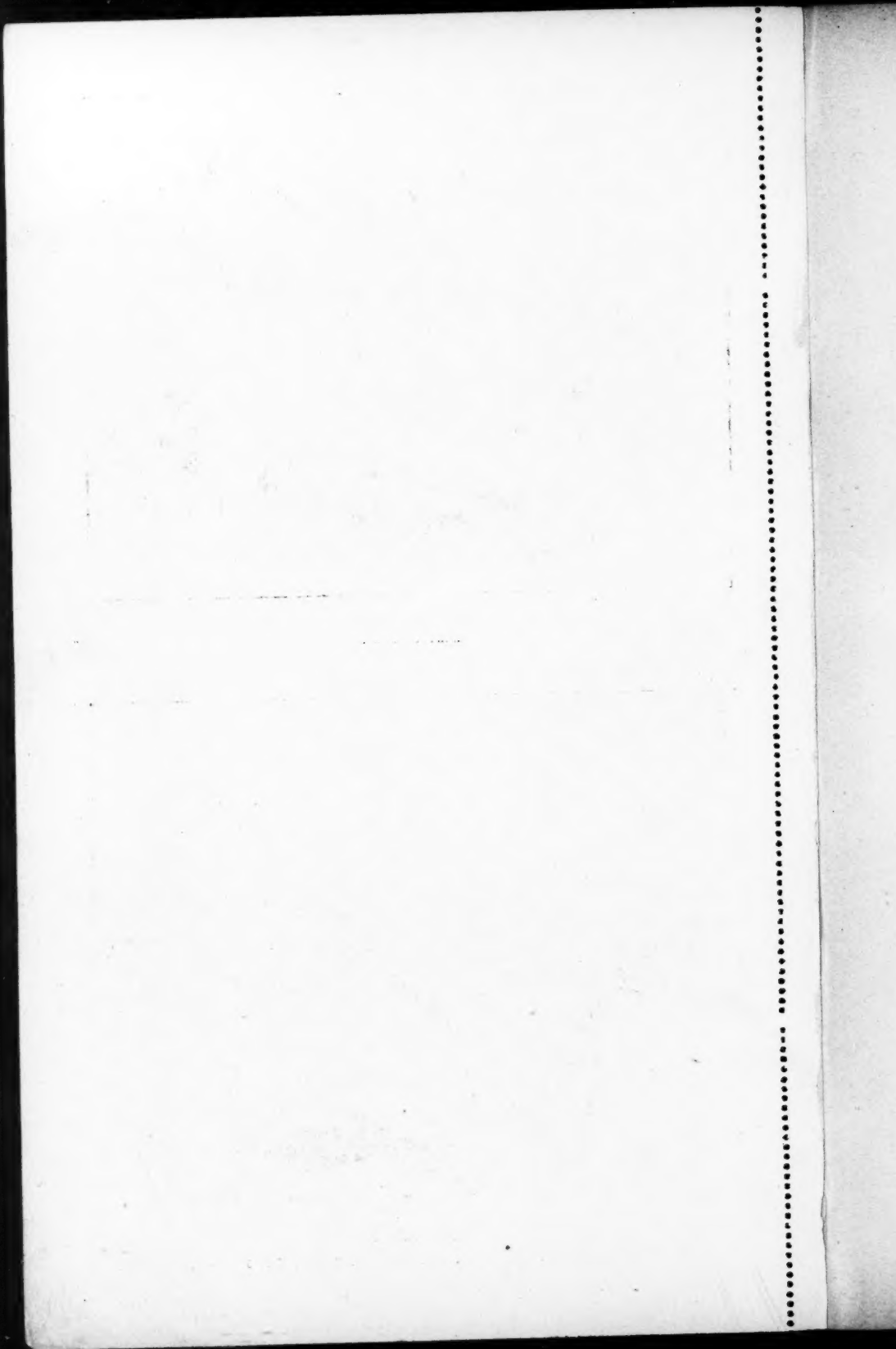


BREECH OPEN.

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From a Photograph supplied by Messrs. Vickers.

See Naval Notes, Page 306.



THE JOURNAL

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ROYAL UNITED SERVICE INSTITUTION.

VOL. XLIII.

MARCH, 1899.

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[Authors alone are responsible for the contents of their respective Papers.]

NOTES ON MUSKETRY TRAINING OF TROOPS:

NECESSITY OF CARRYING OUT THE TRAINING UNDER ACTIVE SERVICE CONDITIONS, SHOWING HOW OUR PRESENT SYSTEM FAILS IN THIS PARTICULAR, AND SUGGESTING MODIFICATIONS IN THE COURSE TO SUPPLY THE DEFICIENCY.

*By Captain H. R. MEAD, D.A.A.G. for Musketry, 2nd Circle,
Bombay Command.*

Thursday, January 26th, 1899.

Major-General A. FITZROY HART, C.B., *p.s.c.*, Commanding
1st Infantry Brigade, Aldershot, in the Chair.

THERE is no doubt that, notwithstanding the late pacific utterances of the Tsar, the whole question of the state of efficiency of our Army, whether for the defence of the country or for the protection of our interests in every quarter of the globe, is receiving more attention than at any former period, not only at the hand of the military expert, but also at that of the general public.

In this connection the great subject of an organisation which will enable us to obtain and prepare the large numbers of men and officers whose services have become necessary to carry out the duties, even in peace-time, of our constantly expanding Empire, has naturally received the lion's share of attention.

It is obvious, however, that whatever schemes may be taken in hand to increase the numbers of men available, we shall have to rely in the future, as in the past, more on the excellence of our material, and on its thorough training, than in the provision of large bodies of troops. The importance of musketry in the training of troops does not need to be insisted on; but there are signs, such as Lord Roberts's able speech, made some time ago, on the present method of training; a letter in the *Times* on the shooting capabilities of our men; and others,—which tend to show that a short review of our methods of training, with a view to

seeing how far they go to fitting our men for the stern test of war, may be of service.

The notes on which the following remarks are founded were collected whilst doing the various duties of D.A.A.G. for Musketry in India for a period of some two-and-a-half years. Towards the end of this period the Tirah expedition took place, and the accounts of the fighting were naturally followed with peculiar interest by one, who, while not having the luck to serve with it, might yet claim to have something to do with the training of some of the juniors at the front.

In India, the musketry staff officer has peculiar advantages in studying the results of musketry training, as he is not only an instructor, but an inspector; thus for six months he is at the school inculcating the principles, and getting into touch with the Regulations and the newest ideas; and for the next six months he is travelling round his circle and seeing how some twenty to thirty regiments carry out the course, viewing the field-firing, and keeping in touch with the troops and their difficulties and necessities. He also has the advantage, which is denied to his comrade holding a similar appointment at home, of seeing two separate systems of instruction carried out under his immediate supervision (the second being that carried out under the native regulations). So that if he is of the least observant disposition he cannot but be led to speculate on the results obtained by different methods of training and on improvements which might be introduced into either course.

The state of efficiency to which the musketry training has been brought may be gauged in one of two ways:—1. Actual field service. 2. By the best imitation we can make of it, viz., field-firing.

With an Army which is being continually employed in different parts of the world on active service, it is certain that we have unrivalled opportunities of testing the value of our system, and it would naturally be thought that a perusal of the various editions of our Musketry Regulations would show that the results of the experiences gained at different times and under different circumstances had been carefully noted and embodied in them.

Undoubtedly we have made great strides in the last fifteen years or so, but this advance has been mainly due to the writings of one officer (Major Mayne), and, moreover, it is based on the results of wars of other countries; whilst our own experiences, though surely more valuable as being, in the first place, more recent, and in the second place as dealing with our own men and what they have effected under active service conditions, have been totally neglected.

After field-firing or manœuvres it is usual to have a discussion of what has been done, for full reports to be written, and the troops to be told of the results and warned to avoid the mistakes which have been detected; but in the case of active service operations it would seem that the advantages of this course of action have been generally overlooked, or that the reports and criticisms which have been furnished have never reached those to whom the perusal would have been a benefit.

Take the Boer war as an instance—has that resulted in our men being taught to fire at moving and vanishing objects under service conditions?

What lessons have been embodied in the Regulations as the result of our experiences in Egypt or the Indian frontier?

It is therefore to be hoped that in the case of the Tirah expedition a departure will be made, and that the lessons to be learnt will be clearly noted, and embodied in the next Indian annual musketry report, at any rate.

This, however, is not available at present, the only resources at our disposal being narratives published by individuals, newspaper reports, and what we may have gathered from pumping the more fortunate individuals who got up to the front. Notwithstanding, however, that our sources of information are necessarily limited, it may still be of value to examine shortly how our troops have got on under this last test to which they have been subjected, and see whether our methods of training have brought about results with which we may be perfectly satisfied, or whether there have been faults and shortcomings which it would be well to set ourselves to remedy. In some respects it must be admitted that the test has been a severe one. A particularly mobile enemy, perfectly trained in guerilla warfare, and for the most part admirable shots, they have certainly furnished us with very difficult targets and made the conditions under which we have operated against them as severe as possible.

This, however, for our present purpose is an advantage, for if our musketry training has been found to come out of this test satisfactorily, it may be safely assumed that it would stand the ordeal of service carried out under more civilised conditions, and in a less difficult country.

Now it is acknowledged on all hands that the behaviour of the troops has been excellent, and that the fire discipline and control have been decidedly good. At the same time we hear of the Afridis in some cases inflicting losses on us, when not in any overpowering numbers, at long, medium, and decisive ranges. The losses on our side have been heavy, and it may be said heavy in proportion to the losses which we have inflicted in return.

It may be admitted that this is partly due to the fact that in fighting a foe as savage as the Afridis have proved themselves to be, that the precautions we have been forced to adopt to prevent prisoners falling into their hands, and even to recover the corpses of men who have fallen in action, have resulted in the loss of five rifles for each man put out of action, and in addition to the formation of a number of solid bodies of men engaged in carrying their wounded comrades to the rear, which in their turn have afforded a particularly vulnerable target to the enemy's sharpshooters.

The remedy as regards tactics is outside the scope of our present subject; what chiefly concerns us here is our apparent failure by our fire to keep theirs under, and thus prevent the serious losses which have undoubtedly occurred.

It will be convenient at this point to quote a few passages which I have noted when reading two or three accounts of this campaign, which seem to me to show up the difficulties our troops encountered and in part perhaps how they were insufficiently prepared to meet them.

1. "Lockhart's Advance through Tirah," page 190.—"As long as the tribesmen are as well armed as they are now, and as long as they are such skilful marksmen, with abundant ammunition, and thorough acquaintance with the country, so long will troops operating against them suffer from well-directed fire at long ranges, and be fired into at night without being able to bring their foes to bay."

Again in the same book on page 249, we find:—"Fortunately there were no more casualties in the Yorkshires—for both British and Native regiments had taken a leaf out of their opponents' book, and become most skilful skirmishers. To do so, however, requires *time*, especially for troops brought up to the campaign from districts in India, where the nature of the country is entirely different; but *sooner* or *later* all the troops had adapted themselves to the conditions which this guerilla warfare demanded."

Now if we turn to the account of the Malakand Field Force, by Lieutenant Spencer Churchill, we find on page 285:—"The tribesmen would dart from rock to rock, exposing themselves only for an instant, and before the attention of a section could be directed to them, and the rifles aimed, the chance and the tribesmen would have disappeared altogether. Better results were obtained by picking out good shots and giving them permission to fire when they saw their opportunity without waiting for the word of command."

On page 184 of "A Frontier Campaign," by Lord Fincastle, the following occurs:—"In fighting of this sort, firing by volleys proved useless and a mere waste of valuable ammunition; while our crack shots, accustomed to taking a deliberate aim at a more or less clearly defined object, were at a disadvantage when compelled to rely solely on snap-shots at a rapidly moving foe."

In contrast to these, I will give two more extracts from Lieutenant Churchill:—"The terrible losses inflicted on the tribesmen in the Swat Valley show how easily disciplined troops can brush away the bravest savages in the open." Again, in his description of the night attack on Nawagai, he writes:—"The fire of the British was, however, crushing; their discipline was admirable, and the terrible weapon with which they are armed, with its more terrible bullet, stopped every rush. The soldiers, confident in its power, were under perfect control. When the enemy charged, the order to employ magazine fire was passed along the ranks. . . . Nothing could live in front of such a fire. . . . Valour, ferocity, fanaticism availed nothing. All were swept away. The whistles sounded; the independent fire stopped with machine-like precision, and the steady section-volleys were resumed."

These extracts all agree in showing up the difficulties of hill-fighting against skilful skirmishers and riflemen, also in the capacity of our troops to meet and defeat the same foe whenever he tries to meet us in the open, or attempts shock tactics.

Our inferiority at present in skirmishing and in firing appears to be generally admitted, nay, more, it seems almost as if it was accepted as natural, and at any rate as far as regards the shooting, without a remedy.

Is this, however, the case? If we can show that our men have not been trained to shoot under conditions similar to those by which they have been generally tested in this campaign—if, moreover, it is established that where they have proved more successful and inflicted heavy losses, it has been because the enemy have, as at Nawagai and in the Swat Valley, and again in the Soudan at Omdurman, provided our men with the class of fighting to which their training has made them accustomed—shall we not be justified in concluding that though severe losses were unavoidable in a campaign of the nature of that just concluded on the Frontier, that they were due not only to the difficulties themselves, but also to the want of training of the troops in delivering their fire under the conditions of active service?

To investigate this it will be necessary:—1. To lay down what is required of our men and their leaders, in order that they may be fit to take their share of work at once on the commencement of service. 2. To investigate how far the training they receive now tends to fit them for this purpose.

Now, in firing at an enemy who is an adept at taking cover, and only exposes himself when taking aim or in moving from one position to another, some of the qualities we require in our men are, for individual fire, quickness of eye to spot his position and estimate the distance, and quickness of aim combined with accurate marksmanship to ensure hitting an object which is only in view for the briefest time.

For sectional fire we require:—1. On the part of the men, fire discipline, which includes smart and efficient handling of their arms. 2. On the part of the N.C.O.'s, control of fire, which includes the power of rapidly estimating the distance or picking it up by observation, and the correct application of drill to the tactical necessities of the moment.

These are some of the qualities which we should develop in our N.C.O.'s and men. Is our present system of instruction such as will produce and foster these qualities?

We will now glance at Table B of the British and Native Musketry Regulations, which will show us the various practices carried out every year by the men of each Army. (See Appendix A.)

The particular point which must strike us in examining these two tables are:—

1. Nearly the whole of the ammunition, the expenditure of which is laid down by regulation, is fired at fixed targets and at known distances.
2. That practically no practice in firing under service conditions is provided for, or at any rate insisted on.

Of course, it may be argued that in the British Musketry Regulations of 1898 that the further training of the soldier is left in the hands of his commanding officer and company commander, and that these have some

81 rounds per man at their disposal ; we will for one moment, therefore, place ourselves in their position, and see in what manner the ammunition is most likely to be expended.

Firstly, what are the considerations which will influence the company commander ? 1. He is naturally ambitious that his company may attain the position of best shooting company ; in working for this, he is necessarily guided by the views taken by his commanding officer (who decides which is the best shooting company). If the commanding officer is an enthusiast in the practical musketry training of men under service conditions, he may lay stress on this portion of the training ; but as long as there is a figure of merit, it does not appear that he can avoid (unless he is very strong as well as enthusiastic) being guided, in his opinion, to a great extent by the figure of merit obtained by the various companies. What does this result in ?

Simply that since the figure of merit is founded purely on practices in Table B, that the aim of the company commander will be at once limited to the improvement of his men in these practices only.

Bearing this in mind, what should we do if placed in the position of officer commanding company ?

1. Put all possible energy into bringing up the worst shots into line with the naturally better ones in individual firing at fixed marks and at known distances.
2. Although warned by paragraph 35 of the Regulations that the ammunition is not given for the general purpose of previous practice, we shall naturally take as liberal a view as possible of what is meant by a few rounds to be expended in this manner, since previous practice will materially aid us in arriving at a high figure of merit.
3. Since the commanding officer is to make a musketry inspection of the squadron or company, we shall probably practise the men particularly for this ; and it is only in the case of the very strong and enthusiastic commanding officer already referred to, that this will take the form of practice in firing under service conditions.

There is but little ammunition left after these necessities have been provided for.

Now to take the C.O. :—

1. Part of his ammunition is used in the musketry inspection of the companies.
2. Neither company, battalion, nor brigade field-firing is provided for from any other source.

From remarks made in the annual report on the musketry of the British troops in India and the Colonies, it appears that complaints made by several G.O.C.'s as regards the inadequate supply of ammunition for this purpose are intended to be met in future from this source.

So if the C.O. uses only 10 rounds a man for his musketry inspection, there only remain 30 rounds a man for the whole of the field-firing, which no one can even call a liberal allowance.

To sum up:—It appears that given a C.O. who is very enthusiastic and strong, he may be able to divert a small portion of the ammunition to the special practices mentioned in paragraph 13 of the Musketry Regulations, and respond to the invitation to exercise his and his company officers' ingenuity in inventing such as are interesting and instructive to the men; but he is greatly hampered in the task, and a weak C.O., or one who is not deeply imbued with the necessity of practical musketry instruction under service conditions, may let this part of the work slide altogether.

The 1898 Regulations therefore, while apparently giving a free hand to the regimental authorities to improve the musketry of the regiment in any required direction, really hamper them in such a manner that their energies must be mainly devoted to the elementary and preliminary portion of the work. In the Native Army the expenditure of the whole ammunition, with the exception of an allowance of fifteen rounds a man (commandant's allowance) for testing rifles and other contingencies, is strictly laid down. It will thus be seen that in both Armies the recruit, after being grounded thoroughly and brought to a certain pitch of excellence, when transferred to the ranks is merely exercised so as to keep up his powers of shooting under the most favourable circumstances, and never taught how to face the difficulties which are inseparable from active service.

We have shown there are some thirty rounds for field-firing, and it is not intended to belittle the value of field-firing for the instruction of troops in the particulars which we are at present engaged in advocating, but not only is the amount very small, but field-firing should be looked on as the final test of the shooting powers of the troops under service conditions, and cannot in any case take the place of systematic instruction of the men in the use of their weapons against an enemy, or the group leaders in the control and direction of the fire in the confusion of action.

Since the above notes were written, the battle of Omdurman has been fought, and at first sight perhaps the large losses inflicted there may be taken as a proof that though our troops in India may be wanting in some details of training, that in Egypt at any rate their efficiency has been roughly tested and has come out of the ordeal successfully.

The question then arises, whether this comparative success is due to any difference in the method of training or can be traced to the different character of the test to which the troops have been subjected.

As regards the method of instruction, since the troops in India and Egypt alike are trained in accordance with Regulations emanating from Hythe, whilst the instructors are also trained at musketry schools (the main object of which are, according to the Regulations, "to secure a uniform method of instruction throughout the Army"), it is evident that given a similar test the troops whether in India or Egypt should produce fairly equal results.

Now wherein does the difference lie in the test to which the troops were put in each case?

1. In the country in which the operations took place.
2. In the tactics to which the enemy resorted to in each case.
3. In the weapons with which the enemy was armed.

Now at Omdurman we have an enemy operating in comparatively open country in masses, trusting to weight and numbers; whilst in the Tirah they pursue pure guerilla tactics in an unknown and most difficult country, and seldom show in any masses except at night, relying on their rifles and their knowledge of the country to inflict as much damage as possible.

What is the result? The test in the first case fits in exactly with the class of training which the troops have received, viz., the power of delivering efficient, well-controlled volleys at a conspicuous mark, whilst in the second case the test calls for further qualities, as already explained in both those who have to direct the fire, and those who have to deliver it. The result being in one case unqualified success, and in the other comparative failure.

The results obtained by our present system of musketry training, seem then to be confined to this, that our troops both British and Native are excellently and thoroughly taught to hit a target, either individually or collectively at most distances up to 800 yards, as long as they have the distances correctly measured for them by an engineer, have a convenient butt against which they can note the strike of the bullets, and as long as the targets give them plenty of time to aim and do not move about or only at a fixed rate of speed, in a direction perpendicular to the line of advance. As soon however as the targets are inconsiderate enough to appear at unknown distances for very short periods of time, or move about erratically, both Thomas Atkins and Jack Sepoy are wanting in the experience to ensure their hitting it.

What it comes to in short is, that we give our men an excellent elementary training, but we do not finish their education. What would be thought of a man who entered his horse for a steeplechase, but only trained him on the flat; or if he taught him to jump, only did so at a slow canter? When it came to the race, would not the want of training in taking the jumps at speed lose him any chance of winning?

Such being our position; what is it we require to teach our men in order to finish their education?

We want to train them to be proficient in firing at vanishing and moving objects at unknown distances, and under conditions which require great celerity in taking their aim, and power of observing the effect of their shots. In collective firing, the training of the fire unit commanders requires extension in the direction of:—1. Observation of fire. 2. Application of fire tactics.

Now the amount of ammunition and time which is now expended in the musketry training of our men is already considerable, so that it would hardly be feasible to obtain the results we are aiming at by any more extended course.

Surely it may also be conceded that :—

1. When the men have as recruits been once grounded and brought up to a certain pitch of excellence as rifle shots on the range, that it does not require an expenditure of 200 rounds a man a year to keep them up to this standard.
2. That it is not necessary or even desirable that all the men should be crack rifle shots of the Bisley pattern.
3. That instruction in firing, under service conditions, furnishes practice in shooting generally (on the principle that the greater contains the less), and being of patent practical value, cannot but prove interesting to the men, and thus ensure their taking extra pains.

Up to the present we have endeavoured to show that our present system of training our men to shoot, as carried out in the expenditure of the annual allowance of ammunition, fails to make them perfectly efficient in all circumstances; our task now will be to re-allot the same ammunition, so as to supply the training in those points which we noted as deficient.

Proposed Re-allotment of Ammunition to be Expended in the Annual Course.—Before actually detailing the expenditure of the ammunition by the trained soldier, it will be necessary to remark that it is presumed his training as a recruit has been carried out in the most thorough manner, and that he has been brought to such a state of efficiency as will enable him to profit from a more extended course.

In order then to teach the trained soldier to fire with decent rapidity, and to be familiar with the sighting of his rifle for intermediate ranges, as well as for the stereotyped distances to which he has been confined hitherto, he might expend 35 rounds individually at five intermediate distances, according as the captain or wing commander might settle. To avoid confusion he should be taught to fire always with the same sight and at one part of the objective, viz., a full sight at the ground line; hence no bull's-eye would be required and the target might be coloured khaki. The target itself should be of an appearing pattern, coming into view for a period varying with the distance, thus compelling the man to get his aim within a reasonable time, and teaching him to be on the alert to watch for its appearance. The size of the target should be such as to give him a reasonable chance of hitting it (the sizes laid down in the British Musketry Regulations would appear to be suitable).

On an ordinary four-section range, as is generally used in India, four men would fire together, and the whole company would be put through a distance in a comparatively short time. The marking should be one

point for each hit, the results signalled down after each party has fired, as is done in the British course when firing rapid individual.

The value of the practice should be shown by a percentage.

It cannot be disputed that the method in which a man has been instructed in time of peace has the greatest effect on him when he is serving under conditions of great stress, as occurs on active service.

If we teach our men in individual firing to do it in the most deliberate way, and to take as long over their aim as they like, is it likely that on service they will be able to shoot with accuracy, when they are necessarily hurried?

Personally, I am convinced that it is all a matter of practice, and that within limits a man can be taught to fire rapidly and accurately, and that if he has been so taught he will be the better prepared for war.

It is to be noted in connection with individual firing, that in India, at any rate, a vast amount of ammunition is expended in rifle meetings, both district and presidency meetings, and also in preliminary firing before the annual course begins, the ammunition being provided out of regimental rifle clubs and from the sale of empty cartridges and lead; and that in consequence a large amount of practice is afforded to the soldier in individual firing, apart from whatever is allotted to it from the annual allowance.

We now come to *sectional* practices, and which we will divide up into two parts:—1. Range practices. 2. Off-range practices.

For the sectional practices *on the range* we allot 20 rounds to be fired in volleys, and 10 rounds to be fired in independent. The volleys to be fired at intermediate distances between 500 and 800 yards, and the independent at distances under 500 yards.

The targets should be much reduced in size from those used in the annual course of the Native Army, but like them coloured khaki.

The following dimensions are proposed:—

Up to 500 yards	-	-	-	-	2½ feet	×	6 feet.
" 800 "	-	-	-	-	3 "	×	8 "
Over 800 "	-	-	-	-	4 "	×	10 "

All sectional practices should be carried out by the entire company, divided into sections and sub-sections, as on service, simultaneously and concurrently, in order to accustom everyone to the noise and disturbing influences caused by the firing of the neighbouring sections.

All snapping, fitting cartridges, and such like practices being strictly prohibited.

The target appearing being the signal for fire to open, whilst its disappearance in like manner would be the signal for it to cease.

In independent, fire should be stopped by whistle, and turned on another target for a time, or else a volley fired, and then independent resumed. This would constitute the obligatory course on the range.

In carrying out all practices with ball ammunition on the range, more stress should be laid on representing as far as is possible some of the conditions of active service.

The usual way in which collective firing is carried out gives no idea of there being any other object in view than to put as many bullets as possible through an obviously inoffensive and conspicuous target.

Without exaggeration, the general procedure is much as follows :—

The sections which are to fire are leisurely marched up to the firing point, probably halted for some minutes standing, whilst cartridges are handed out and arrangements for their comfort are attended to.

All this time the targets (representing a peculiarly bold but perhaps incautious foe) are staring the party in the face, but taking no other interest in their proceedings.

Finally, as likely as not, the sections commence by snapping a couple of times before proceeding to business (in order to get them steady).

The style of work just described has long jarred on myself personally, as no doubt it has on others; the bugbear of a figure of merit, however, works against more practical methods; the regimental officer thinks that without this coddling of the men they will not be able to get so many hits on the target, and that therefore his shooting will compare unfavourably with others. Three seasons of inspection work have given me now some experience of different regiments, and of the amount of this coddling that they find necessary, and as a general rule I have found that the less there is, the more self-reliant are the men and officers when called upon.

Finally, last year it was my fortune to see a regiment where the very opposite plan had been in operation for some years, and the difference in efficiency was something remarkable; whilst at the same time the figure of merit was quite one of the best in my circle.

In this regiment all the preliminary and elementary work of drilling the men to work together, etc., is carried out at the proper place, viz., the parade ground, and when the company or companies (for they as often as not have two companies firing together at contiguous ranges) come on to the range they at once behave as if the targets really did represent an enemy; they are brought on to the firing points in the formation in which they are required to fire, and commence the practice without a moment's delay. The result being that the men are not kept dawdling about, and take twice as much interest in the proceedings. Also being thoroughly accustomed to the sections or companies on the flank firing at the same time, they take no notice of them, and fire as good crisp volleys under the more difficult circumstances as other corps manage to do when firing each section carefully by itself.

We now come to the second part of the sectional practices, viz., those to be carried out off the range. The importance of these practices does not require to be insisted on, the only question being the provision of suitable ground. It will be well first of all to state roughly what our requirements are, and then see what chance we have of supplying them.

1. *Extent*.—Depends on the number of troops using it at a time, and the nature of the ground behind the targets.
2. *Nature of Ground*.—Depends on what is available, almost any kind of ground can be made of use. If cultivated, arrangements must be made either to fire at such times as the crops are off the land, or to make such arrangements as will avoid damage being done.
3. *Firing Rights*.—These must differ with different places according to local circumstances; in some firing would not be restricted, whilst in others it would more or less.
4. *Proximity to Barracks*.—This again would vary according as ground could be obtained; if some distance, arrangements would have to be made for the troops being encamped and getting through the whole of this portion of the course at one go; field-firing and company training might also be worked in at the same time, with advantage possibly.

I have only touched on these points with regard to England, as in India these difficulties do not exist, or only in a very modified form. In England, however, we see the Government making a great deal of the few small steps that they have up to date taken to secure land for even manœuvring purposes and for ranges. If, however, it is once recognised that the proper training of troops cannot be carried out without facilities for firing on rough ground being provided, a way will probably be found, even if it necessitates legislation.

Of course, it is easier to arrange in India, where there is more unoccupied land, but even there it happens as often as not that part of the ground which is utilised for field firing or manœuvres, is cultivated, and the rights of the *rayat* are as strictly enforced there as at home. It is only the fact that in India the absolute necessity for field firing at any rate is so fully recognised that these difficulties are there got over, generally by paying compensation for actual damage done. The time of year selected is naturally when the fewest crops are standing, but in any case with care the damage done is small, and the full value is obtained in the instruction afforded. In the field firing at Mhow in March, 1898, for instance, the damages came to Rs12, and this though some of the ground was under poppy cultivation, probably the most valuable crop in the district.

Well, having got our grounds available, the next question is, What are we going to do with it?

In addition to carrying out certain fixed off-range practices, which will be detailed later, we want it for carrying out small tactical exercises with ball, and any experiments for which the range is not suitable; in fact, we wish to have these grounds as miniature Okehamptons for the training of the men under service conditions. They should, therefore, be fitted up with a number of pits for working the targets, so disposed that it may be possible to represent a force in any required part of the ground. There should also be a store containing a supply of targets (moving, vanishing, etc., described later), which, together with the pits, would make it possible to represent any action which "the enemy" might

be required or likely to take. These grounds could be gradually constructed by the labour of the troops, and in India a portion of the field-firing money, instead of being allowed to lapse to Government, might be utilised to defray the expenses.

We will now go on to detail the off-range practices, but before doing so it will be well to first see how far we have got towards training the men for active service.

We have now taught them to aim quickly individually, to work hand and eye together, also to note for themselves where their shots are going to, and not to depend on having the exact position of the last shot shown them by a disc on the target. In sectional practices, we have given the men practice in fire discipline, and tested them under conditions somewhat more resembling the noise and confusion of action than they have been previously accustomed to; in addition, we have taught the unit commanders the elements of fire control, how to maintain it under difficulties, and how to observe the effect of the fire.

We have now to make the men practically proficient at moving and surprise targets (individually), and to teach the unit commanders how to pick up a totally unknown range by trial volleys, and how to apply drill movements to the tactical requirements of the moment, so as to be able to bring his men rapidly into position to fire, and then to be able to deliver the fire with the greatest effect.

Off-Range Practices.—Ten rounds per man expended in skirmishing over the rough practice ground from 600 to 150 yards of the targets (heads and shoulders), which should appear at irregular intervals for periods of 10 seconds at a time, should soon teach the men to use hand and eye together, and their wits to see where their shots were going, and make the necessary corrections. Also being carried out on rough ground the use of rests and cover could be properly taught.

Twenty rounds a man for section volleys at intermediate distances between 500 and 1,000 yards, and 10 rounds for half-company or company volleys over 1,000 yards (neither the distance nor the position of the target being known) would teach the fire unit commander much in the direction of observing and controlling the fire, and also in handling his command.

The targets should be surprise ones, and appear at irregular intervals of time, for a period of 15 to 20 seconds. The first appearance being the signal for the company, which should be on the move, forming in its direction and opening fire.

Independent fire should be practised within decisive limits (up to 500 yards), and for this 10 rounds are allotted and two rates of fire instituted:—

1. Deliberate, the men working in pairs, one observing whilst the other fires, and *vice versa*.
2. Rapid, as fast as they can fire with efficiency, British troops with magazines.

The fire should be altered from one rate to another occasionally.

In carrying out these off-range practices, as free a hand as possible should be allowed; the superintending officer being encouraged to think

out for himself what particular principles he is desirous of instilling into his unit commanders, and what particular nature of practice he wishes to afford his men. For this reason all details of firing positions, formations, etc., have been purposely omitted.

With the same idea, it might be distinctly of benefit to allow the superintending officer to amalgamate any two or three lots of practices together, so as to form one united practice.

For instance, the 10 rounds over 1,000 yards might be all fired together, two targets being employed (not necessarily at the same distance) and fire directed first on one and on its disappearance on the other. In the same way with volleys between 500 and 1,000 yards any two or three could be combined, and indeed it should be permissible to combine the volleys with the independent, and thus practice changing from one nature of fire to another. Working in this way, a number of useful combined exercises might be worked out by an intelligent commander.

The difficulty of observation of fire is recognised in a short paragraph in the 1898 British Regulations, and a few rules are given for guidance. That it should receive attention is obvious, but how it is to be obtained under the conditions of the present annual course is not so clear. With the exception of field-firing and long-range volleys (the last of which is not obligatory), all the collective fire is practically carried out on the range at known distances, and under these conditions there is really no scope for it. It is hoped that by arranging that the range practices should be fired at intermediate distances, that something may be effected as a preliminary step, by forcing the unit commanders to watch the fall of the bullets and correct the elevation accordingly.

In off-range practices a further advance should result, as now there is absolutely no clue to the distance. In order to teach the method of picking up the range in a systematic manner, a leaf might now be taken from the Artillery Regulations. The method referred to is of course that of the long and short brackets. An instance is given to show how it works. The correct distance of the target is 1,580 yards. The company commander estimates it as 1,400 yards (or takes the distance by range-finder, as the case may be).

Company commander:—"Fire half-company volleys from the right at [the target] 1,400 yards."

The first half-company commander fires with an elevation of 1,400 yards, and naturally goes short.

Company commander to left half-company commander:—"Elevation 1,500 yards."

This volley also goes short, of course.

The right half-company then fires with an elevation of 1,600 yards, and goes just over.

The next correction is to 1,550 yards, which is probably sufficiently close to drop the majority of the bullets about the target; if not, a further correction to 1,575 yards is made.

In this way a range is automatically picked up. The illustration we have given is purposely not too favourable a one, the object being to

show the certainty with which a range can be found, even when the first estimate is a bad one.

The instruction which is now given in fire discipline and control, as laid down in the Regulations, under the form of three exercises, has done much to improve the drill, and give life to it; as also has the introduction of the system of continually opening fire on different objects during battalion drill. It is recognised in paragraph 149 Musketry Regulations that this instruction is a preparation for carrying out collective practices on the range. But as has been shown, the provision of fixed targets, and the fact of there being no time limit imposed in carrying out these practices, has had the result of misleading officers into thinking that this application of drill to fire tactics when on the range is quite a secondary matter.

I have found in the course of my work that this has further resulted in a partial paralysis directly ball ammunition is issued. An instance will perhaps best explain what I mean.

Last year I was asked to prepare a few simple schemes by which the G.O.C. could test the musketry efficiency of the corps in the station in a practical manner off the range. As the time at my disposal in which to get the targets ready was very short, I was limited to particularly simple arrangements. They were as follows:—

I had three pits dug, placed in echelon to each other at a distance of, say, 100 yards apart; each pit had two targets, one in front and one behind.

The instructions to the men working the targets were, on the "G" sounding, to commence pulling them up in turn, commencing with the furthest pit, and with the furthest target. The first target to be in view for 20 seconds and then disappear, the remainder to be in view for 10 to 15 seconds each. The result aimed at was to represent a body of cavalry passing across the front obliquely, each target as it came into view showing the position of the cavalry at that particular moment.

A red flag was put up at the firing point, which was distant some 300 to 400 yards from the nearest target.

A company each from the British and Native regiments in the station were selected to fire, and were placed at some distance from the flag. They were given the following instructions:—

March your company as the main body of an advance guard towards the red flag. When nearing it you will see a target come into view; this represents a body of cavalry crossing your front. You will form in its direction as quickly as possible and open fire. This target will remain in view only 15 to 20 seconds, after which it will be replaced by other targets appearing and disappearing in turn, and representing the successive positions of the cavalry. You will open fire on each target in turn, till your 10 rounds are exhausted.

Well, the company marched up; when they were approaching the red flag the "G" was sounded, and the first target duly appeared. The company was halted and knelt down without forming in its direction, which was rather oblique to its front. Then there was a painful pause,

and nothing further was done till the target had disappeared after the stipulated time. They managed to wake up in time for the second target, but were considerably flustered, and the results were far from satisfactory.

The only reason I could find for the want of promptitude in opening fire was that they were quite unaccustomed to open fire with ball ammunition at once on seeing a target, and were waiting to hear the bugle sound the "Fire," and to get themselves comfortable generally.

The Native regiment made similar delay, and the G.O.C. observed that this sort of thing wanted more practice.

It has been sought to supply the practice, in the proposed course which we have been suggesting.

In addition, 30 rounds a man should be allotted to tactical musketry instruction, the instructor being hampered by no regulations, and only required to formulate some four or five schemes.

These schemes may be varied to any extent, and with the aid of moving and surprise targets of a cheap and simple construction any idea may be carried out with a very fair approach to realism. Generally speaking, the principle to be observed would be that each scheme should seek to be as free of complications as possible, and to teach some particular lesson, or illustrate some particular phase of an action which might occur on service.

As an illustration we give the following:—

The company is sent out to reconnoitre and bring back information of the strength of an enemy which is known to have taken up a position in a certain locality. For this purpose it is extended in skirmishing order with its scouts in front.

The scouts find a few of the enemy extended (represented by gurras), and open fire. Shortly after a surprise target comes into view, and is taken as a sign that the enemy are strengthening the post, and that in order to obtain any more information it will be necessary to call in the scouts and to thicken the firing line, which is accordingly done.

As the attack develops, a moving target representing a counter-attack on the part of the enemy advances from one flank or the other.

The company commander has then to make his own dispositions to meet and repel the same.

Five to 10 rounds should be expended in each scheme, one or two of which should be carried out during company training, and made to illustrate some particular incident that has cropped up during the course of the previous work. One scheme might well be carried out at the end of the training before the commanding officer as a test of the efficiency of the company.

The schemes just described would take the place most effectively of the old company field-firing. For field-firing in brigade, or for regimental field-firing, we would put aside 40 rounds per man, which should allow of something more realistic being carried out than is possible with the meagre allowance at present available. At the same time it would be advisable to give the G.O.C. a free hand as to its expenditure. For

instance, it might occur that in his command one regiment might be so placed that it was temporarily unable to take part in field-firing with advantage. In this case, he should be perfectly free to transfer the ammunition to other corps which could make a more profitable use of it. Fifteen rounds a man remain to be disposed of to complete the 200. These will serve to meet all contingencies, such as testing rifles, and as a company officer's allowance.

A few remarks regarding surprise targets may be of value. Their use is persistently recommended in the 1898 Regulations, but no description of them or how to work them is afforded, with the exception of a vanishing target worked on an iron pipe, which is a very inefficient one, since it affords no variety in the position of the target after each disappearance, and has other defects.

The general conditions which this style of target must fulfil are:—

1. Simplicity; so that they may be made up in any regimental workshop and kept in repair.
2. Cheapness.
3. Safety in manipulation.

The usual effects we wish to represent by their use are the following:—

1. The firing line coming up into view as the men rise to fire.
2. Supports or reserves coming up to reinforce the firing line.
3. Flank or counter-attacks moving.
4. Cavalry charges.

Generally speaking, by adopting a system of surprise targets, which can be raised and lowered at will from different positions, and a few moving targets, we can represent most phases of an action with sufficient realism.

The surprise Target A (Sketch A) can be worked from a pit or other shelter, and as one man can manipulate three or four of them at any distance up to about 50 yards from the shelter, it only requires a little combination of them to produce any desired result.

Sketch B is a target which has, I believe, been used by artillery, and is useful when it is required to bring a large number of targets into view at once.

Sketch C is the very best moving target I have come across. It was designed by Captain Rodwell, R.H.A., for use at an artillery camp. It has the great advantage of lightness and springiness, and can be worked, in consequence, over any ground. At the Mhow field-firing it was pulled over fields of jowari stubble with long thick stalks with perfect ease. By attaching it to a gun limber or to a pony, it can be brought along at a fast gallop.

Sketch D is adapted from a Russian paper, and would be used to represent the advance of a skirmishing line, where the men sink into a kneeling position to fire after each advance.

All these targets can be easily and cheaply constructed and kept in repair. For India, bamboo is perhaps the best material to form the framework, as it is cheap, light, and strong.

In perusing reports of field-firing in India and at home, I have found that it is very seldom that any but fixed targets are used to represent the enemy. In an attack on a prepared position it is often the case that only the targets representing the supports and reserves are touched, these being often of considerable size, and perpetually standing, naturally draw the fire sooner than the heads and shoulders of the firing line. Of course, in reality these should only appear when it is desired to represent the reinforcements coming up to the firing line; this can only be simulated by the use of disappearing targets.

Some little trouble is involved in working surprise targets, but after one has got familiar with their use this is greatly reduced, and the benefit obtained is ample compensation.

We may now proceed to tabulate the whole course which it is suggested should take the place of the present one.

Individual Fire—Range Practices.

Thirty-five rounds at seven intermediate distances from 200 to 800 yards, with time limit at surprise targets.

Sectional Firing—Range Practices.

Twenty rounds section volleys from 500 to 1,000 yards, at surprise targets, with time limit (whole company practised simultaneously).

Ten rounds independent, under 500 yards, surprise targets.

Off-Range Practices.

Ten rounds individual skirmishing, between 600 and 150 yards, at targets appearing and disappearing at irregular intervals.

Twenty rounds sectional volleys, between 500 and 1,000 yards, at targets appearing irregularly at intervals of fifteen seconds.

Ten rounds half-company or company volleys over 1,000 yards.

Ten rounds independent, at two rates of speed, under 500 yards.

Thirty rounds for tactical musketry schemes under the supervision of the captain.

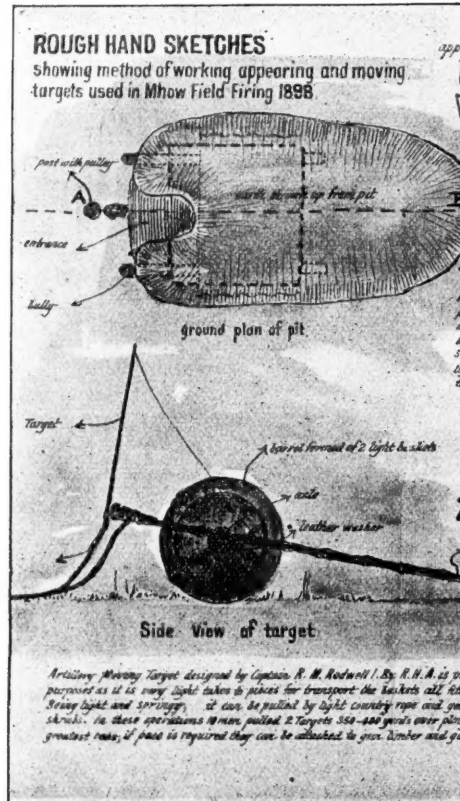
Forty rounds at the disposal of the G.O.C. for field-firing or experimental fire.

Fifteen rounds commandant's allowance, and for contingencies.

Total—200 rounds per man.

We have now completed our suggestions as to the best way to utilise the ammunition allowed. It remains to be seen whether the adoption of any such course as we have suggested would affect present arrangements in any way.

First of all, it would be difficult, if not impossible, to affix any standard of merit, at any rate for off-range practices, as the conditions under which they would be carried out by different regiments and even companies, would vary in every case. As the range practices are purely instructional and introductory to the remainder of the course, it would not do to judge a regiment by the figure of merit obtained in carrying them out, though it could be easily enough calculated and rendered.



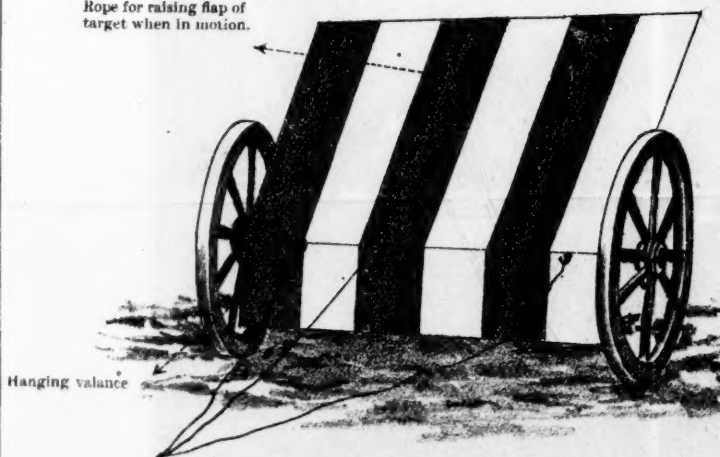
SKETCH B.

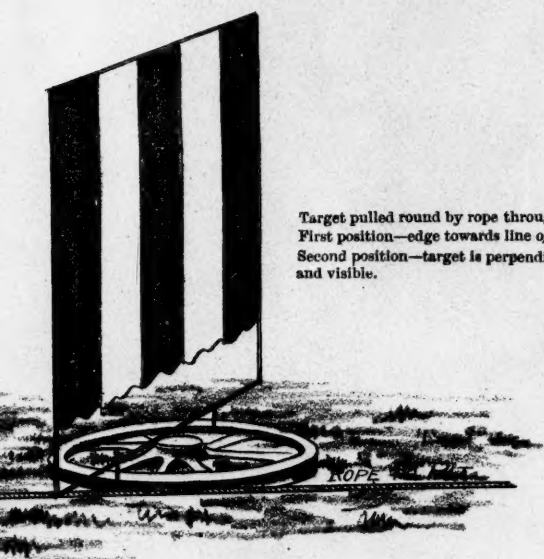


SKETCH C.
Front View.

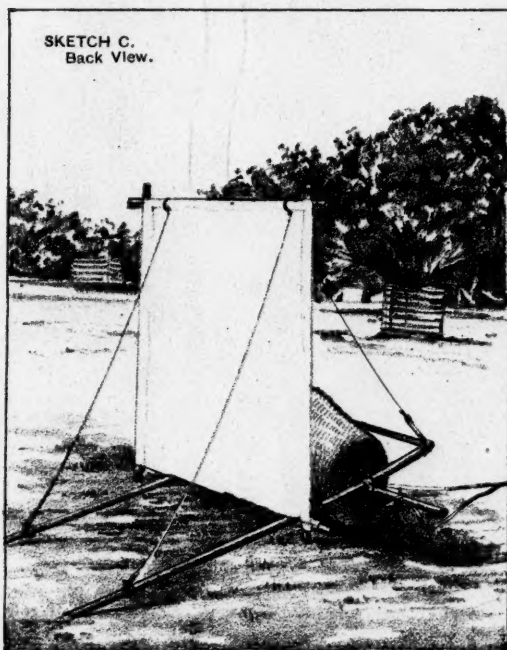


Rope for raising flap of
target when in motion.

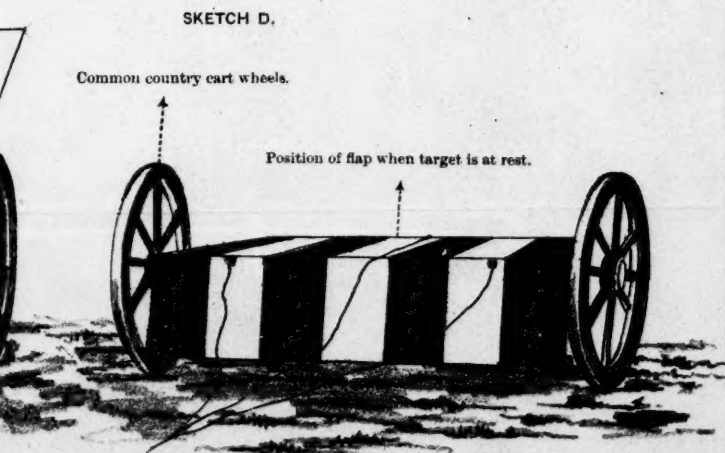




Target pulled round by rope through half circle.
First position—edge towards line of fire—target invisible.
Second position—target is perpendicular to line of fire,
and visible.



SKETCH C.
Back View.



SKETCH D.

Common country cart wheels.

Position of flap when target is at rest.

How, then, is it proposed that the efficiency of a regiment should be judged? By the opinion of the G.O.C., formed after careful inspection, in the same way as is done in any other portion of a battalion's work,—is the natural and only answer.

As it is, the figure of merit is only a guide, and not always a trustworthy one. And if we want to know the efficiency of a regiment as a fighting machine, it is to this authority we must turn for an opinion, which by taking in all the circumstances of the case is the only reliable guide.

As to tabulating regiments in the order of their supposed efficiency, the present annual report of the musketry in India, which publishes regiments in the order of their seniority, and not in the order of their figures of merit, shows that this is now looked at as a matter of smaller importance than it used to be.

One other point affected is the earning and grant of prize money.

The distribution of the grant for range practices would be simple and much the same as at present, but in the case of the off-range practices greater freedom would have to be allowed. In order to assist officers commanding companies or wings in their determination what units and commanders were deserving of prizes under the schemes they had prepared, a system of detailing an officer of another company or wing to assist as umpire, might prove efficacious. It might also prove of advantage in awakening an interest in outside companies as to the nature of the different exercises which different commanders initiated.

I would add that it would be of undoubted benefit if every scheme which was carried out was fully reported on, after it was completed, and those which were found to be of greatest practical value in the instruction of non-commissioned officers and men noted for future use.

So much for our ideas as to the steps which should be taken to make a still further advance in the direction of perfection in musketry training. They depend, of course, greatly on the way in which they are carried out, but to most officers a freer hand will only be an incentive to taking an extra interest in the task of preparing their men for the ordeal of "active service."

APPENDIX A.

STATEMENT SHOWING EXPENDITURE OF AMMUNITION BY BRITISH CORPS, UNDER PRESENT REGULATIONS:—

Table B—British Troops—Individual Range Practices.

No. Rounds.	Target.	Distance.	Remarks.
14	3rd Class	200 yds.	} Deliberate individual firing at fixed distances (known), and without time limit.
14	2nd Class	500 "	
7	"	600 "	
7	"	800 "	
42			

Sectional Range Practices.

No. Rounds.	Target.	Distance.	Remarks.
21	4 ft. × 8 ft.	300 yds.	7 rapid, 7 independent, 7 deliberate volleys.
21	" "	500 "	Ditto ditto.
14	" "	600 "	7 deliberate, 7 rapid.
21	" "	800—200 yds.	Attack practice on range.
<hr/> 77			

(All these practices at fixed Targets—Range known.)

In addition at disposal of Captain - - - 40 rounds.

" " Commanding Officer - 41 "

Grand Total—200 rounds.

APPENDIX B.

STATEMENT SHOWING EXPENDITURE OF AMMUNITION BY NATIVE CORPS UNDER THE PRESENT REGULATIONS:—

Table B—Native Regulations—Range Practices—Individual.

No. Rounds.	Target.	Distance.	Remarks.
7	3rd Class	200 yds.	} Targets fixed, distance known, time unlimited.
7	" "	300 "	
7	2nd Class	500 "	
7	1st Class	700 "	
7	" "	800 "	
<hr/> 35			

Sectional Practices.

No. Rounds.	Target.	Distance.	Remarks.
5	12 ft. × 6 ft.	800 yds.	} Deliberate volleys at fixed targets.
5	" "	700 "	
5	8 ft. × 5 ft.	600 "	} Moving.
5	" "	500 "	
5	" "	500 "	Deliberate, fixed target.
5	" "	400 "	Rapid.
5	8 ft. × 2½ ft.	300 "	Ditto.
5	" "	200 "	Rapid independent.
<hr/> 40			

Miscellaneous Practices performed on or off the Range (practically always on the range except in case of Field-Firing).

No. Rounds.	Target.	Distance.	Remarks.
10	2 ft. square	100—200	Moving.
5	" "	" "	Vanishing.
10	Optional	600—150	Attack.
10	—	—	Company field-firing.
10	—	—	Brigade or regimental field-firing.
15	—	—	Commandant's allowance.

General W. GORDON (Indian Staff Corps):— I may first say that I was instrumental, after the Mutiny, in introducing the subject of this lecture—the musketry instruction of the troops—into India, and that I was for many years employed at Army Head Quarters in supervising that training. The original regulations for the training of the Native Army were prepared by me, and though the impulse under which the field-firing practice subsequently first came from General Lord Chelmsford, then Adjutant-General in India, I, under the authority of Lord Napier of Magdala, prepared all the orders for that practice, with the sole view of training the troops for actual service in the field. These orders appear to be still in force. The nature of the field-firing introduced in India was largely illustrated at the Delhi Imperial Proclamation Camp in 1876, when a whole division under Sir Donald Stewart, with due proportions of artillery and cavalry, fired with ball. There were many foreign officers then present who were struck with the advantage to the training of the soldier thus practically obtained, and consequently all the principal foreign Armies have also instituted and carried field-firing into their regular practice. I have been too long out of touch with the troops, and with the present editions of the Musketry Regulations, to feel myself able to enter into a discussion of all the details recommended for your consideration by the lecturer. I am sure, however, that they will receive due consideration in India, under the authority of Sir William Lockhart; by Colonel W. Hill, the present able Adjutant-General for Musketry at Army Head Quarters, himself a most accomplished marksman, who also commanded a brigade in the Tirah Campaign, and who is therefore well qualified so far as the Native Army is concerned, to submit the subject to His Excellency the Commander-in-Chief for consideration. But there are two points of principle in the musketry instruction of the Army on which I would submit an opinion. First, the objections to the system of what the lecturer calls “the bugbear” that a figure of merit, and its publication in order thereof, offers to the more practical training by company and commanding officers, in the efficient training of the men for service. In my humble opinion, this system should be much modified, if not got rid of. I felt the objections the lecturer raises before I gave up, in 1878, the position I then held at Army Head Quarters in India. I think the publication of results of the annual course should be given, as in the Army List, by seniority, and that the figure should be confined to the important individual firing at fixed targets only, leaving all collective practices at other distances and objects, to be carried out as the responsible commanding officer may direct. The commanding officers and generals of the present day are in a very different position as regards their capacity to supervise musketry training than they were in the days when that instruction was first started in the Army. All I would suggest is, that generals should base their annual reports of inspections as carried out on a more lengthened acquaintance with the men's practical efficiency in the use of the rifle under service conditions than has hitherto been customary. They could do so

somewhat under the plan the lecturer has submitted—a plan I myself followed when a general officer in command of a district. The second point to which I would draw attention is the length of time lost by the troops in opening their fire, and in getting aim, the dwelling on aim, to which the lecturer refers. Go to the Bisley camp and watch a squad of the finest shots in England firing for the Queen's Prize, and see the time, from right to left, taken in getting into position, and then, after the rifle is in the shoulder, you may often count fifty, as slowly as a watch ticks, before the rifle is discharged. I entirely agree with the lecturer on this point. If the competition at Bisley is to prepare for such shots as the lecturer demands for frontier service in a country like Tirah, the Queen's Prize should be at disappearing targets, and then a limit of time for getting aim would necessarily follow. I maintain that for practical musketry training some important change in this direction is desirable. I think the lecturer must have been somewhat unacquainted with some of the older regulations issued regarding the training of the troops in India under service conditions. In the Indian Appendix of the British Musketry Regulations, published in 1876, and in the Native Musketry Regulations for 1877, the last I prepared, these conditions are especially dwelt on, though perhaps not sufficiently so, both for the collective practices and for field-firing. Firing at moving objects and also at appearing and disappearing targets were then also required to be practised, and in very many places carried out. I have to again welcome the advanced nature of the lecturer's ideas on these important subjects. Some of his recommendations may be found impracticable, but many are so excellent that I hope to see much benefit from this discussion. There is not a single instance recorded during the Afghanistan war of 1878-9-80 of any want of efficiency in the use of the rifle by any troops employed under Sir Donald Stewart and Lord Roberts; neither was the state of the arms (Martini-Henrys and Snedders) nor the condition of the ammunition found in any way defective. I think, therefore, that some of the strictures regarding past want of consideration of service conditions and of neglect are hardly due. By all means let us progress. There can be no standing still in musketry or in everything else. I might offer some further remarks as regards the selection of ranges, the position and light thereon, but I have said enough to show that, in my humble judgment, the training of the soldier for service conditions should not be to make it easy to establish a target figure of merit, but to accustom him to meet all the difficulties for effective fire against a wily and determined enemy in a difficult country and in the varying aspects that light may cause.

Lieut.-Colonel J. G. COCKBURN CURTIS (late Oxfordshire Light Infantry):—The lecturer has shown very clearly how great a hindrance and obstacle is the system of having a figure of merit to the practical training of the soldier for battle-firing. The same arguments and considerations which the lecturer has brought forward apply with equal force, if not greater force, to our system of giving prizes. Our system of giving prizes renders it practically impossible for a war practice to be carried out as if it was really a war practice. It makes it the interest of section commanders and men to evade the very difficulties which it is the intention of war practices to teach the soldier to overcome. There is another very great objection, to my mind, in giving prizes for musketry. It gives rise, in the minds of civilians, to the belief that there is something in musketry which is not part of the ordinary duty of the soldier. My own experience in teaching the soldier is that anything which has a clear reference to his training for war he uses to his utmost endeavours to learn; therefore it would be only necessary for a more practical method of instructing the men in battle-firing to be adopted, for the men to take the greatest possible pains in their firing. It will be within the knowledge of most of us that shortly after the regimental musketry specialist—the musketry instructor—was abolished, a very great improvement in musketry took place. Musketry instruction, which was formerly considered

the duty of one officer in the regiment, was then recognised, rightly, as being the duty of all officers. Up to now this principle, curiously enough, has not been considered to hold good in the case of staff officers. What branch of musketry, I would ask, is there which should not be known to every staff officer? I have been a musketry staff officer myself, and therefore know something of the duties which are carried out by musketry staff officers, and I know not which of the duties of the musketry staff officer there is which could not in the Regular Army with advantage be carried out by commanding officers of regiments and by the ordinary staff officers of a district.¹ Were the Hythe instructors appointed from officers who have had the advantage of the tactical training given at the Staff College, instead of, as at present, from officers who are simply good drills and shots, the musketry training for war of the Army would, I think, rapidly improve.

Major F. N. MAUDE, *p.s.c.* (late Captain R.E.), 1st Hampshire Royal Engineers (Volunteers):—I came in just in time to hear a little anecdote which really rejoiced my heart, viz., the description of the field-firing day, when a company marched up, the "G" sounded, the target appeared, but the company was not square to the line of fire, and before it could get into the new front the target disappeared, and nothing was done. For years—I should not like to say how many field-firing days I have attended in India, Aldershot, and elsewhere—I can recall similar instances, and everywhere one noticed the slowness with which the firing bodies got on to their target, and the reason was, as Colonel Curtis just now suggested, that the musketry instructor was one person and the adjutant was another, both working to obtain different results—the former wanted a good figure of merit, and the latter cared only for smartness on parade, and between the two the fighting efficiency was forgotten and fell to the ground. This was before we began to get into field-training ways, before the marked improvement which has taken place in the last few years began to be really manifest. I was a great deal in Germany at the time, and I had much opportunity of seeing the German officers working in what we now call company field-training. There, although the drill is most accurately and precisely laid down, still with regard to firing exercise and words of command, great latitude was allowed to the captain. Where we laid down in the old days that you first of all marched up the company, dressed it, gave the word "At so many hundred yards . . . volleys, independent," and so forth, and then the word "Ready!" they would generally drill simply at the words "Halt!" "Ready!" and as they gave the words "Halt!" and "Ready!" simultaneously you saw every rifle come down horizontally, and the men were ready for anything that turned up. All this time they were drilling at moving targets. They sent out files to different places on the ground, and then changed front or formation, and opened fire from the new alignment, and as they formed up every rifle came down at the "Ready!" each man with his eyes on the object, never looking down. That alone gave a wonderful idea of their drill. After several weeks of this company drilling you can hardly wonder that they were smart and ready when the big manoeuvres came on. I was present at these in 1883, and there I recall an instance of the kind of thing that does happen, may happen, and has to be allowed for on service. Two long opposing lines of troops were closing over undulating ground, cavalry patrols had withdrawn, and there was nothing whatever between the two opposing sides. One side came on with the usual skirmishers, a strong firing line with supports and reserves behind. The other side was an ordinary two-deep line marching up the hill ready for anything that turned up. The two lines met at the top of the hill and it was a very curious thing to see what happened. The first line of skirmishers, the

¹ If figures of merit and musketry prizes were abolished, more than half the work now carried out by musketry staff officers and Hythe would cease.—J. G. C. C.

moment they caught sight of the enemy, threw themselves down, and as they did so a roll of the hill concealed their object; but the other side which did not throw themselves down but simply gave the words "Halt!" "Ready!" sent volley after volley into the supports over the heads of the lying-down infantry line, whose fire was masked by the aforesaid undulation. The umpires rode up—Moltke was only 500 yards away—and they put the extended line out of action at once. That gives an idea of the immense power which resides in, as the Yankees say of their pistol firing, the man (*i.e.*, troops) who is "first on the drop." I cannot see the object of drilling troops, if it is to take them, as General Gordon said just now, fifty seconds to get a volley off. But it is a fact, and we know it, that they often do. You want to see a body of troops when it is brought up, open just like a quick-firing battery in action, volley after volley following quickly down the whole line. It could easily be done. There is no reason whatever why we should not train the infantry to actual perfection, each section of a company to deliver its fire as steadily, quickly, and effectively as a quick-firing battery on the coast does now and with the same words of command. With regard to the figures of merit, that question has been a stumbling-block to everybody. If you have a good general, what other figure of merit can you possibly want than the general's opinion? Do you want to see it worked out in decimals? We all know that such comparisons are worthless for practical purposes. The light may be different and everything different. But if Lord Roberts rode up and said:—"You men shoot better than any others in the Army," do you think that we want any higher praise than that? And it would be a move in the right direction the moment we clear our minds of the semi-sporting pot-hunting element. It is the curse of the Volunteers, and has been the curse of everybody for a long time. If we would only realise that the object of all military training is to teach troops to kill the enemy in the field, and not to avoid getting killed themselves, we should get a better, steadier, and far more reliable infantry in action than all the pot-hunting at Bisley and elsewhere will ever give us.

Major POLLOCK (late the Prince Albert's Somerset Light Infantry):—This very interesting lecture to which we have listened this afternoon is one which, it so happens, appeals to me possibly more than to anybody else here, because the subject is one which I chose for an article in the *United Service Magazine* in August, 1897, and I see that a great deal in that article is in perfect agreement with this lecture, and that is to me all the more gratifying. I should like to narrow the discussion a little bit, and bring it down to the elementary matters to which I think the lecturer rather intended it to be confined. I take it that successful shooting in the field and everywhere else depends on three things: the soldier, his drill, and the officer who handles him. The soldier, I think, comes first. Drill cannot make anything of a man who cannot see, for instance—nor can the officer. That is only one example. Now my opinion of musketry training is that you take a recruit, and the first thing you want to teach him is to shoot in the ordinary way—make a mechanical shot of him. Then when you have got him so that he can hit a target, spend plenty of time in letting him try his hand at moving and vanishing, running man, or anything of that sort. But it is an absolute waste of ammunition to set him at targets that run away from him, or at him, or round him, until he can hit a fixed target. In this connection I think that we might learn a great deal from the Volunteers. In the Volunteers a man is not permitted to shoot in the second class until he has made 45 points in the third; similarly, he cannot shoot in the first until he has made another qualifying score in the second. We take a man who cannot hit a target at 300 yards, and run him clean up the range only to pour so much lead into the butt, or the sea, or whatever it may be—anywhere except the target. I should like to see the greater part of the ammunition put practically into the commanding officer's hands, leaving him, in conjunction with the company officer, to settle what individual men are fit for, and to

employ them accordingly. If you have a man who cannot shoot, try and teach him to shoot. If you have a man who can shoot, teach him then to be a field shot. The Boers have a reputation for being wonderful shots—or rather, they used to enjoy that reputation. The reason those Boers were such good shots was because they had constant practice on the veldt buck. But shooting at marks, say a gin-bottle or an ant-heap at 100 yards, the average Boer was nothing very remarkable. I have myself shot successfully against Boers, though I never was a good shot. I can remember an occasion when four British officers, of whom I was one, shot against a Boer and beat his head off. Next day that Boer took us to some favourite hunting-ground where there were lots of buck, and he killed more than all four of us put together—because he was practised as a field shot, and we were not. This is what the lecturer has been telling us, that our men need to be trained as field shots, under service conditions. But it is no use attempting to train a man under service conditions until he has shown that he can hit a fixed mark. Let us go for having the soldier first taught to shoot, and go on making him repeat, repeat, and repeat, as they do in the Volunteers, until he qualifies. A man may have to repeat the third class say three times, and perhaps not get out of it then. Let us try and apply the same thing to the Regulars, and not let men waste their ammunition in shooting at ranges at which they cannot hit at all. There is one particular matter in the lecture which I should like to notice before I sit down, and which is the soundest point of all, I think. It is with regard to abolishing the round bull's-eye in the centre of the target. I believe I can be more brief by reading my own words from the *United Service Magazine* than by attempting to say what I mean, now on the spot. In my article I said this:—"At present we teach men to aim at the foot of the target in combined practices, whilst in individual firing we oblige him to aim at the centre. This does not seem right. More consistent teaching to aim low seems to be desirable." I think General Hart will agree that this is a point which might be insisted on with real advantage; in short, to abolish the round bull, and to put a straight one up the middle in place of it. Another thing the lecturer has pointed out is the advantage of having large-sized targets. We should practise a man in the third class at a full-sized target 8 feet by 6 feet, and thus have the advantage, if he shoots a trifle high or low, or to the right, or to the left of the part that counts, that you can tell him absolutely accurately where his shot has struck. You have a better chance of knowing what mistake the man has made, and you can put him right. If you can show on the target that the shot was high, the man will believe you—because the marker proves it. But if you merely tell the man that his shot went "high right," and he cannot see that it was so, he probably thinks it was "low left," and will not believe that you have seen it through the glass—because you cannot prove it.

General W. GORDON :—May I say a few words more with reference to what Major Pollock has been saying regarding third-class shots? The question of firing up the range by an entire company was very much considered in olden days when I was at Army Head Quarters. It was considered that if on service you took a whole company into the field, you ought to train and practise it as a whole. If a proportion of the men were first class, one-third, say, second class, and very few third-class shots, and you wanted to employ the company as a whole, you could not pick out all the third-class shots and leave them behind. So that in training a company it is essential that all the men should fire right up the range. Then again, the subject of third-class shots is one which I have very much gone into. I had returns prepared to illustrate what a third-class shot really is, and I found that with the few exceptions of "defect of vision" it was caused very often by simply bad health, by being out of form, and that a man could not get out of the third class for that reason. Now a man may be third class one month and may be a very good shot next month, when he has recovered his health. Therefore I think

it would be a great mistake¹ to go back to the system of repeating the practice in the third class. In the last edition of the Native Musketry Regulations I prepared (of course in India we could not for British troops differ from any of the Hythe Regulations), it was laid down that the third-class shot was not to be further practised, as an Army regulation. The commanding officer could give him such further instruction as he thought fit, but that no more returns of third-class shots were required at Head Quarters. I should like to see the name of third-class shot got rid of. I think it is unnecessary for practical efficiency, because the men are quite anxious enough to get out of the third class themselves. They hate the idea of being called a third-class shot, and there is no necessity for calling them so. All the requirements of the Service will be met by leaving them alone and encouraging them at the proper time to do their best.

Lieut.-Colonel Lord RAGLAN (Royal Monmouthshire Royal Engineers (Militia); late Captain Grenadier Guards):—Major Pollock has already said nearly everything that comes into my mind, for though I agree with much of what the lecturer has said, I also think he has not laid enough stress upon the importance of thoroughly grounding a man in his shooting when you first get hold of him. To my mind, to take a man who is a bad shot at a fixed mark and try to make him a good field shot, is like putting a chisel in his hand for the first time and telling him to make a cabinet. If a man cannot hit a mark when he knows where it is, it is impossible that he can hit a mark under field service conditions. Captain Mead, in his scheme, makes no provision for any firing by the trained soldier at a fixed mark. I think anybody going deer-stalking would have two or three shots with his rifle at a fixed mark before he went out to try and kill a stag. In the same way, a man who has not fired a shot for many months, before shooting at unknown distances ought to fire at something he knows he has a fair chance of hitting. I know that in the Militia, where men who have not handled a rifle for twelve months, are 200 yards away from a third-class target standing up, often miss, even old soldiers who have been good shots in the Army, and if a man misses two or three times he gets his tail down and he does not try again. I am afraid I am repeating what Major Pollock said, but I want to emphasise it, because I believe that the most important point in musketry is to give a man confidence in his weapon by putting him up to shoot something he can make sure of hitting, when he first begins either his recruit's or his trained soldier's course.

Captain MEAD, in reply, said:—There are very few remarks that I have to make in reply. I do not think there is much disagreement with the main argument of my lecture except on small points of detail. Colonel Curtis said something about prizes, and I fully agree with what he said, viz., that the giving of prizes is hardly required at all, and that it would be much better possibly if they were given to the regiment for the general encouragement of shooting, rather than to the individual soldier. With regard to what Major Pollock and Lieut.-Colonel Lord Raglan said about not allowing men to fire at

¹ I am here arguing only in the case of the soldier having been originally, when a recruit, efficiently instructed as such. All recruits should be kept under instruction till their best power as shots is fully developed. I here give an extract from a letter from a *General Officer* lately received, himself long an instructor of a British regiment—an inspector and a commanding officer of a battalion:—"The weak point in musketry instruction in England is the inefficient grounding of the recruit. As you are aware, recruits, especially at depôts, are frequently hurried through their musketry course, as a mere matter of form, and contract bad habits which it is often nearly impossible to eradicate afterwards. The training of Native regiments in India shows a marked contrast. The teaching in most regiments that I have seen of late years is admirable. A man once properly taught can no more forget how to shoot than a man who has once learned can forget how to swim."—W. G.

moving targets before they had been properly grounded, I had this in my mind when I wrote out the lecture, but I thought it was sufficient when I remarked that the training of the recruit should be such as to ensure this grounding. I think that the training of the recruit should be made very severe, in fact as severe as you like, and that if he cannot come up to a certain standard he is not good enough for the Service. I cannot believe it at all an advisable thing to have your Army trained with one half of it fit for the purposes of war, whilst the other half cannot be brought up to this standard. The whole must be trained as a fighting machine. Therefore I say that the training of the recruit must be such that he is fit to take his place in the ranks and learn the higher branches. One other remark was about the trained soldier firing at fixed marks. In this connection, a point which I think Lieut.-Colonel Lord Raglan did not notice in my lecture was—I am here, of course, relying on my Indian experience—I said the men in every regiment had an enormous amount of pure target firing all through the year, without reference to the annual course. I think if the regiments are left alone you will find that is quite sufficient.

Lieut.-Colonel LORD RAGLAN:—There are many regiments at home we know who are not in a position to do much firing at all.

Captain MEAD:—My experience at home is nil. In India I know many regiments which fire their annual course two or three times in practice before they come to doing it pukka. That has been my experience. Since I wrote my lecture I found an article in the *Pioneer* which may be of interest, as it shows that they are taking some further steps in India in the direction of musketry training for service. The following is a short *précis* of this article. It points out first of all, that musketry training has been much improved in the last ten years, but that there is still room for improvement in the direction of practical training. It goes on to complain that the recent frontier expedition has shown that except in a few instances, as Chakdara and Malakand, it still takes a quantity of lead to kill a man. In addition to the action already taken by Army Head Quarters regarding the training of troops in mountain warfare, it says that more is still required. "We want not merely to train our troops to crown heights, piquet camps, escort convoys, force defiles of kotals, and effect retirements without serious casualties; they must be so instructed that while defending themselves they can inflict heavy losses on the enemy opposed to them, and to effect this they must shoot straight, at the right moment, and in the right direction." New proposals were started in 1895 at the instance of General Gosset, who urged that field-firing with larger bodies than a regiment could not possibly be made effective, owing to want of ammunition. On this, Colonel Hill (A.A.G. for Musketry) made proposals as follows:—1. Men qualified as marksmen two years in succession to be put through a special course (including long-range and night firing). 2. Third-class shots to be put through individual firing twice. 3. In selected stations, regiments to suspend the range practices for the year and carry out field practices in their place. 4. In the last case the money grant to be handed over to the lead and cartridge case fund, as grants in aid to encourage rifle shooting as a pastime. 5. General officers to be the authority to decide whether the proficiency of the regiment and the suitability of the ground would warrant the expenditure of the ammunition in this way. This system is now to be tried in five regiments of the Frontier Force, the distribution of prize-money is to be left to commandants, and a full report is to be furnished on which the continuance and extension of the system is to depend. As may be guessed from my previous remarks, the only point in this to which I take exception, is the elimination of third-class shots from further training. I cannot see how the Army can be trained as a fighting machine if part of it is, and part of it is not, up to the standard. I think more might be done in the training of the recruits, and that they should be practised to a high standard,

and the men who from physical or other reasons are not able to come up to modern requirements should be got rid of.¹

The CHAIRMAN (Major-General A. FitzRoy Hart):—Gentlemen, when the Council invited me to take the Chair to-day I felt a considerable amount of hesitation, because I hold some decided opinions contrary to our present system of musketry instructions. At proper times and places, on those blank pages in his report where the commanding officer has annually to put, and is directed to put, any observations that he is pleased to make on the subject of musketry, I have not failed year after year, when commanding a battalion, to note down my convictions distinctly. But it would be out of place for me to stand up here in public and criticise regulations that it is my duty to see zealously carried out. The subject is so interesting that I could not resist my desire to preside to-day. The lecturer has taken as his subject the desirability of making musketry instructions follow exactly the circumstances of the battle-field. To use his own words, he said, "The necessity of carrying out musketry training under active service conditions." Of course, he means as nearly as we can under those conditions, because we can never imitate the distracting incidents of the battle-field; and, as he has himself shown throughout his lecture, we can never eliminate from the equation of peace and war, those functions that are formed upon consideration of limits of range, ground, and consideration of public safety in firing. The lecturer has provided us with a great deal of very valuable pabulum for reflection, and I have no doubt that what he said will receive the consideration that it deserves from the authorities both at home and in India. We must, I am quite convinced, distinguish in musketry distinctly between what I call *civilian firing* and *military firing*. Let civilians by all means shoot as they like; let them take their time over their aim, let them be as comfortable as possible, let them lie down on blankets and mattresses, let them have a tent over them if they please, let them smoke the foresight and paper the backsight, and let some of them arrive at a perfection of firing which is really marvellous. We ought to have nothing whatever, as soldiers, to do with that sort of shooting. Those conditions do not resemble the conditions of the battle-field, and it is not our purpose in the Army to produce a small percentage of marvellous shots, but to produce a minimum percentage of bad shots. General Gordon has made some remarks with which I agree. He thinks that the lecturer has not quite done justice to the progress that has been made in musketry, and I must say that if the Hythe books that have been produced during my service were laid out on a very long table and studied, there would be found to be a very considerable and interesting evolution in musketry. The primitive bull's-eye with its rings, on a ponderous iron immovable target, has developed into something bearing some resemblance to a man, and movable; and at the same time instruction has developed from an effort under favourable circumstances to shoot a captive bull in the eye, into an effort under unfavourable circumstances to shoot a fighting man anywhere. With all this the improvement in the rifle has gone on. By efforts of mathematics, and mechanics and chemistry, a very great improvement has been produced in the rifle and in its ammunition. Colonel Gordon, I think, is justified in saying that more attention has been given to the improvement of musketry than the tone of the lecturer would lead us to think, and you will see all through the instruction which is going on now, and in the introduction of vanishing targets, surprise targets, and so forth, that the principle is quite recognised that if we are going to train a man for a prospective season of snipe shooting we certainly should not, with that objective, put him through a course of stalking sleeping crocodiles. I hope that the time is not far distant when the whole responsibility of musketry training will be

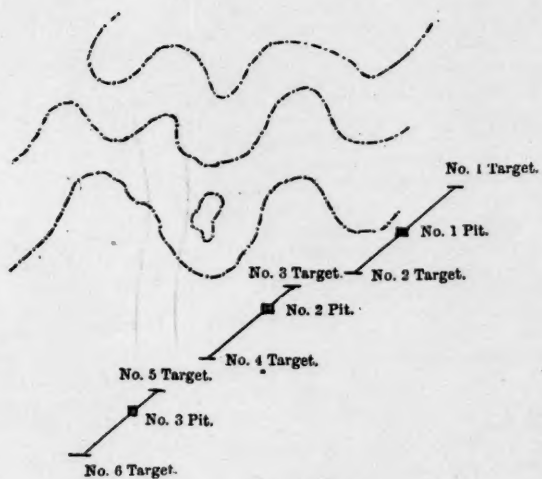
¹ I should like to state that my experience being purely Indian, this remark was made when I had the Indian *Native* Army more in my mind than the Home Army. In the case of the Indian Army the recruiting problem is not so acute as at home.—H. R. M.

given to the commanding officers of battalions as thoroughly as is the training in tactics. Certainly the power now exercised of selecting commanding officers makes such a step much more reliable and easy; whereas in the past it might have been a matter, as you can imagine, of very serious apprehension and difficulty. I do not see that there is any more importance in musketry or any more difficulty in musketry than there is in tactics, and I must say, speaking from my own experience, that I feel quite convinced that if the musketry training of my battalion had been handed over to me as fully as was its tactical training, I could have cheerfully undertaken to improve its shooting, in the term of my command, by something like as much again. I should be very glad indeed if the present system of pay for shooting were abolished. I think Colonel Curtis made some remarks upon that subject which met with a degree of applause which leads me to think the meeting will agree with me. Where you have public money to account for, you at once have Government paper, and you know that the way in which that paper is bound up for interment in the catacombs—I mean for disposal in the pigeon-holes of offices—has given it the nickname of “red tape.” This term is perfectly understood. The manly and cheerful exercise of rifle shooting is entangled in, and hampered by, the mass of red tape which accompanies our annual course of musketry. The abolition of the present system of pay for musketry would at once do away with most of the red tape. I agree with Colonel Curtis that a soldier does not want to be paid for doing his military exercises efficiently. We have a voluntary Army in which men—certainly a great number of them—enlist out of a predilection for that kind of work, and I think that where military exercises are satisfactorily carried on, the soldier really enjoys them. I should certainly not object to the commanding officer receiving annually a grant of money, to be disposed of in musketry prizes as he thinks fit, in the way he does in the cheerful and effective system of battalion rifle clubs. Colonel Curtis said that he objected to prizes as administered, but he did not say that he objected to prizes altogether. I think, perhaps, you will agree with me that prizes may be made a very considerable stimulant, and that if a commanding officer had at his disposal funds out of which he could give prizes for shooting, as arranged *according to his own programme, free from red tape*, it would be a very good thing. I should like to make a remark on the subject of teams. Nothing has been said about regimental teams. I think that some of you may have heard what those teams are. In some regiments teams have been kept off duty, I believe, all the year round, and some teams, I have heard, have been even paid and specially fed, and so forth. At all events, what we arrive at is this, and everyone knows it—the regimental team which shoots for a prize is no indication whatever of the musketry efficiency of the battalion which it represents. I am very glad that you have received that result with applause, because it encourages me to think that my remark to follow may take root. What I would suggest as a remedy for this would be the drawing by lot from the trained men of the battalion the number, with a few over, that are required for the team—the few over, in order to allow for any casualties that may occur, and to ensure the impossibility of filling any casualty by a selected man. In that way you cannot, of course, completely eliminate good and bad luck, but you can arrive at something which approximates to a crucial test of the comparative shooting efficiency of the battalion, by which only the conquest of a challenge prize ought to be esteemed. There is another benefit which would come with it. If teams were selected by an appointed committee, by lot, there would be always the danger of there being inferior or bad shots in it, and therefore you would have this great motive all through the regiment of having as few poor shots as possible, from the very fear that some of them might be drawn in the team. Another subject which has not been mentioned, and to which I may briefly call attention, is quick firing. Our instructions in musketry have been mainly devoted to putting control over fire, and very necessarily so, on account of the tendency

of the man to fire away all his supply of ammunition at the greater ranges, and not to have enough when he comes to the more important and closer ranges; but we must not overdo that. There comes a time when quick firing is of the very greatest importance; it is when the enemy arrives, or is approached, to close quarters. There is then a period when the faster the man can fire, the better chance he has of success. In fact, it would probably be that the side would win which at close quarters poured in the most fire. There remains, therefore, for consideration the exercise of quick firing, which of course can be done, and I have done it myself with my own battalion, by using dummy cartridges in order that a man's fingers may get sufficiently expert in working very fast—but, mind you, for only a short time—a limited number of seconds, perhaps. This leads me on to say that I hope it will be considered by the authorities whether *firing from the hip* shall be introduced. We all know that very good shooting can be made from the hip, and it seems to me that if a man can be trained for a critical time of the action, and at very close quarters, to make his shots from the hip, the side which can fire from the hip will have a very distinct advantage over the side which has to bring the rifle to the shoulder. That will lead on to the matter of repeating rifles. Undoubtedly the nation that first introduces repeating rifles will have gained a great advantage over all the others, and all the others will have to follow suit as soon as possible, for the very reason that at the critical time the repeating rifle will do execution that no other rifle can do. Finally, gentlemen, I must remind you that the Commander-in-Chief, besides his own great personal experience, has at his disposal a far greater amount of valuable information than anybody else; and that not what irresponsible persons think ought to be done, but what responsible persons know can be done, is the foundation upon which the regulations are built on which we have to act. I beg, in conclusion, to thank the lecturer on behalf of us all for his very interesting lecture.

ADDENDUM.—I quite agree with Lord Raglan in his remarks upon the kind of encouragement needful to recruits commencing rifle practice. So long as a man remains a bad shot he requires a course of elementary instruction and practice that would be nonsense for men who can shoot fairly or well, and he is unfit for any higher course.—A. F. H.

SKETCH OF PITS AND TARGETS (*See page 247*).



Flag from which firing commenced.

Line of advance of company.

THE RELATION OF PERSISTENCE OF VISION TO MODERN RAPID VISUAL SIGNALLING.

By ERIC STUART BRUCE, M.A.Oxon.

Thursday, February 2nd, 1899.

Lieut.-General Sir ANDREW CLARKE, G.C.M.G., C.B., C.I.E., R.E.,
in the Chair.

ANYONE who watches a body of soldiers signalling with flag, lantern, or heliograph, cannot fail to be impressed by the intelligence, agility, and skill displayed. It is a performance involving not only accurately timed movements of arms or hands, but an arduous exercise of what is the most subtle, sensitive, and highly complicated sense-organ created by Nature—the retina of the human eye. The efficiency which has been attained in modern rapid visual signalling in the ideal possibility of twenty words a minute and the practical working of twelve words a minute, is the result of considerable labour and time expenditure on the part of those who are responsible for the selection and training of signallers, for though there are more difficulties than one to be contended with in the production of a reliable signaller, there is one master difficulty which makes the process of selection laborious, tedious, and often disappointing. This is a difficulty arising from a property inherent in the retina of the human eye, and which is called Persistence of Vision. I venture to think that any system which tends to alleviate the burden which this optical fact imposes upon the instructors of rapid signalling, will have the consideration of a Government which before all others has realised the necessity of inter-communication in the operations of war and excelled in its development.

I have taken for granted that all here present know that by persistence of vision I mean the retention by the retina of the impression of any object for a short time after the object itself has been withdrawn. The images which thus remain on the retina after the exciting cause is withdrawn are called sometimes positive accidental images, sometimes incidental images, and sometimes consecutive images.

We can recognise persistence of vision without the aid of any instrument. Were it not for persistence of vision the rain shower would be falling drops, not lines of water; the meteor in the skies would be bereft of its glories, being merely a fiery ball leaving no glittering path behind it; and in man's imitation of a meteoric shower—a display of fireworks—the most elaborate Catherine-wheel ever designed would resolve itself into a few points of fire. Foremost amongst the older instruments designed to illustrate persistence of vision was the Zoetrope. In this, successive positions of the bodies of men and animals in motion were in turn so rapidly brought before the retina that the synthesis of the various impressions gave a fairly lifelike representation of the actions of the subjects. But now the Zoetrope has been improved into the Cinematograph, in which instantaneous photography supplies faithful representations of the different positions of objects in motion, and in place of the puppet-like performance of the Zoetrope we have photographs which come to life, and any past scene, whether it is the bustle of a railway station, the execution of a ballet on the stage, the breaking of a tempestuous sea on the shore, or the grim realities of a naval engagement, can be preserved and re-acted for the delectation of posterity. It has been my privilege to add another instrument to the list of those devised for illustrating persistence of vision. My claims for novelty and usefulness in the instrument I have invented and called the Aerial Graphoscope are :—

1. While it shows the general effects of persistence of vision in a striking manner so that a whole audience can see them, it carries its penetrative qualities of instruction further than the older instruments designed to illustrate the phenomenon; for instance, it appears to be the only instrument which shows the difference in intensity between the real image and the incidental image, and the gradual fading from the retina of incidental images.
2. It forms a most delicate test of the exact duration of persistence of vision on the individual retina, and it is in this second capacity that it applies to the subject we are specially dealing with this afternoon, viz., the relation of persistence of vision to modern rapid visual signalling.

Before I treat of the special application of this instrument for measuring the duration of persistence of vision, I will explain the general action of the instrument to you, and show you how it emphasises the existence of persistence of vision.

The vital principle of the instrument is this narrow lath of wood, painted white in front, with a grey centre gradually diminishing in shade to white. This lath can be rapidly revolved at its centre by means of a multiplying wheel or, if it is preferred, by an electric motor. On the lath, which is now at rest, I throw a small portion of a magic-lantern picture representing a statue. When the lath is revolved rapidly you see the

whole picture before you apparently in space [experiment shown], the explanation being that as the lath revolves it receives the different parts of the picture in turn. Owing to the fact that the retina of the eye retains for a short time any impression presented to it, the various portions have not time to fade before the whole picture has been successively projected on to the lath. The picture therefore does not really exist as a whole in the place where it appears. As a whole it emanates from each one's retinal organ and is developed by each one's individual powers. It may therefore be correctly described as an image in space, and its ghostly character is made apparent when I place this lighted candle behind the revolving lath, the real objects being seen through the vision.

When a lath of 76 centimetres long and 5 centimetres broad was revolved by an electric motor placed 1 metre 14 centimetres from the nozzle of the lantern, the number of revolutions per half-minute required to produce a really steady image was 318. The lath used this afternoon is 5 centimetres wide, so as to obtain a very brilliant picture, but the persistent image is obtainable by using a surface of only 1 millimetre in width.

I can further impress upon you how vividly this instrument shows persistence of vision by a series of experiments. I take out the slide from the lantern and revolve the lath, thus obtaining a phantom disc. When I let the little ball fall between the lantern and the incidental disc we see four shadows of the falling ball at the same moment. When I revolve this iron ring we see a number of distinct rings at the same time. When I take this piece of zinc, with a slit in it, and project the slit on the disc, moving it backwards and forwards in the lantern, the image of the slit is not only multiplied, but so distorted as to give the appearance of hieroglyphic writing. I have mentioned that the apparatus shows the difference in intensity between real and incidental images. When we consider persistence of vision in its relation to army signalling we shall see that the distinction between real and incidental images is of great importance, so I will now make it manifest to you by means of this instrument.

You will have noticed that the centre of the lath is tinted grey, gradually diminishing in shade to white from the centre towards the extremities. This has been done to preserve the artistic effect of any picture thrown upon it. It is, in fact, there to reduce to some extent the effect of the variance in intensity between the real and the incidental image; to give the centre of the picture as far as possible the same intensity of illumination as the outer portions. The centre of the lath in revolving is always before the eye. Here there is no incidental image. When there is no picture in the lantern and only the bright disc shown, though that centre is tinted grey, there is a brilliant centre in the disc, white in comparison with the outer portions. Here you see the difference in intensity between the real and incidental image. Let me call your attention also to the diminishing intensity of the illumination of the disc from its centre towards the extremities as it becomes less and less

re-inforced. This shows the gradual fading from the retina of incidental images. I now fix a piece of white paper upon the central portion of the lath and then throw a picture upon it as it revolves. The contrast between the central portion and the rest is still more strongly marked.

The exact time that the persistent image remains on the retina varies with the intensity of the illumination with which objects are perceived and with the sensitiveness of the individual retina. Probably also, the perception of persistence varies with the sensitiveness of that complex mechanism which connects the rods and cones of the retina with the grey matter of the brain. It is conceivable, too, that the brain itself has a part in determining the time of persistence. Other circumstances are also responsible for variation in the duration of persistence. By means of actual tests that I have taken with the Aerial Graphoscope the same person can have a very different capacity of persistence of vision at different times of the day according to the circumstances under which he is placed; for instance, within a few minutes his capacity of persistence of vision may widely differ if within those moments he has taken violent physical exercise. In many cases persistence of vision shows different durations for objects viewed under the light of different colours. It also varies with the condition of the retina at the moment. Persons who have rested the retina by being in the dark show a different capacity from that shown when the retina is more fatigued. I have mentioned that the Aerial Graphoscope affords a most delicate test for ascertaining the time of persistence on the individual retina. In this respect, the apparatus promises to be useful not only in physiological laboratories but in schools of army and navy signalling as a means of testing the retinas of would-be signallers as to their capacity of persistence of vision.

The tables before you refer to some hundred tests I have taken with sixty-seven persons under varying conditions. We have seen that to produce a good steady image on the incidental disc a speed of some 318 revolutions a half-minute is desirable. The persistent image is, however, visible, though not steady, at a much lower rate than that, the exact rate being a matter of individual capacity. If we ascertain the rate of revolutions at which each individual can just see persistence, we can calculate his particular capacity of persistence.

The arrangement of apparatus I have employed for the purpose is as follows. A lath 76 centimetres long and 5 centimetres broad was revolved by an electric motor, provided with means of counting its revolutions. The motor was worked by means of a 5-cell electric storage battery, through a resistance with sliding contact. The lath was placed 1 metre 14 centimetres from the nozzle of the lantern, in which there was an oxyhydrogen blow-through jet. In the lantern was placed a slide representing a statue. I have this arrangement here. I will commence revolving the lath 27 revolutions the half-minute. At this speed some persons in the audience probably see a complete image of the statue, others require a faster speed. I therefore move the sliding contact so

that more resistance is thrown out of the circuit. The lath revolves faster and faster, thus accommodating the capacities of the various retinas in the audience, until we reach a point when the statue is visible to the whole audience.

Table I. shows a group of 25 tests I took in 1895. The low rate of 27 revolutions per half-minute, at which the persistent image was just visible to myself and assistant, both accustomed to observe the incidental disc, was taken as the lowest limit for the test. This was the mean of four readings, the variations in the running of the motor being but slight. The persons taken for the test were of both sexes and of various ages and classes, and described themselves as of good sight, except two marked on the list. None wore glasses. In the Tables I. and IV., M stands for male, F for female. The apparatus used for the earlier tests of Table I. was somewhat more rough-and-ready than that employed for the later groups; but I consider the results of the tests sufficiently accurate to quote, as several of the tests were the mean of four readings, the variations in the running of the motor being but slight. I may also add that one person that I had tested with the rougher form of apparatus came out the same when tested again with the more improved arrangement. In this group you will notice that 14 of the 25 persons could see the persistent image at the low test rate selected, viz., 27 revolutions per half-minute. This gives a long persistence on the retina—as much as 2·2 seconds. In making these calculations it was necessary to remember that the lath being revolved at its centre, each part of the picture is re-inforced twice during each revolution. The shortest persistence on this list is ·652. The reason for the high readings is doubtless the brilliant oxyhydrogen light employed in the lantern, and placed at such a short distance from the revolving lath. They show that one of the most determining factors in the duration of persistence of vision is the intensity of the illuminant under which objects are seen, and that the quotation of any average for persistence of vision such as $\frac{1}{30}$ or $\frac{1}{30}$ of a second, without any reference to the nature of the illuminant, is exceedingly vague.

The results of Table II. are of special interest, as it tabulates tests of 26 subjects before and after bodily exertion. The subjects were school-boys selected from various schools. They all undertook to be tested first, in their normal condition, and secondly, immediately after violent exercise in the form of running for several minutes. No one was tested the second time until he was panting for breath. In the results of these tests it will be noticed that the persistence of every subject was altered by running except one, who registered the same figure, viz., 1·05 in each case. The record of seven was lowered, but that of nineteen was heightened. From this result it would seem that bodily fatigue tends to prolong persistence of vision, which I believe is the tendency of illness. These tests have not been treated in any way from a medical point of view, but I may point out one case appearing in Table IV. of a person enjoying perfect health, who said she had never known a day's illness in her life; she comes out at 1·39, a medium reading.

As I mentioned in my recent lecture on persistence of vision at the Society of Arts, it would seem that the varying durations of persistence of vision in different individuals and under different circumstances tend to support the photographic theory of vision, which seems to have had considerable confirmation from certain experiments with X-rays on the retina—shadowgraphs having been observed on the retina, as if it were a sensitive plate. Since by this theory an actual photograph of everything we see is fixed on the retina by one chemical process, and removed by another, may we not suppose that these chemical processes would go on at the same rate in the retina of different persons, and that the rate of the removal of the visual photographic image corresponds to the rate of the removal of what we call the incidental image? Perhaps also it is reasonable to expect that after the system has been weakened by bodily exertion, the speed of the removal of the photographic image would be lowered.

Table III. shows tests made under different colours compared with white light, the rays from the lantern passing through red, green, and violet glasses. These tests were made with five females. Those marked in the table * are the mean of three readings. The reason why I occasionally took the mean of three readings was not that the subjects were undecided, but because I was anxious to be sure of the accuracy of the tests by obtaining several uniform runnings of the motor. It is satisfactory to state that the motor gave very uniform readings, coming out time after time exactly the same figure. With regard to these colour tests, there have not yet been a sufficient number of tests to lead to any definite conclusion, though in most cases a different reading is obtained.

The first three persons who were tested for colour were also tried after the retinal rest produced by being kept in the dark for some minutes. The first two give a higher reading of persistence than under white light, the third a lower. No. 1 of Table IV. is remarkable as having taken the highest number of revolutions in the half-minute to see persistence, the figure being 101. She described herself as being of good sight. In this list two tests of persons wearing glasses are tabulated, the persistence of one comes out at 1'304, the other at '779.

To pass now to the main point of this lecture, the bearing of these facts upon modern rapid visual signalling: When I move my hand rapidly backwards and forwards in front of this candle, the flame is alternately hidden from and exposed to view, but you see the candle flame all the time, owing to persistence of vision. Thus in the same way, a light inside a signaller's lantern is visible, through persistence of vision, when the shutter obscures the actual light from reaching the eye. In reading the signals, the signaller is discriminating between real and incidental images, a rather delicate operation, for I have shown you by an experiment the difference between real and incidental images is one of degree of illumination. It seems evident that the signaller's sharp reading of dot and dash will depend upon the persisting capacity of his retina. Is not, therefore, a good signaller likely to be one whose persistence of vision is

abnormally low? According to this theory, No. 1 of Group IV. would be the best signaller. No. 8 represents the reading of a highly trained signaller, which is '76.

It would seem that one of the most important tests for a signaller is that of his persistence of vision—a test which has not been hitherto applied. In a lecture delivered by Colonel Keyser before the members of this Institution on 10th February, 1893, he says that out of a batch of twenty men struck off to form a signalling class, the average number who are likely to prove of any use as efficient signallers is seldom more than three. The reason of this small proportion being qualified to serve as signallers is explained by the tables before you. This is, doubtless, the varying capacity of persistence of vision in different retinas. It is for detecting the differences that I propose the use of the Aerial Graphoscope in the hands of the signalling instructors. Its possible value in this respect was, I think, completely summed up in the discussion which followed my recent paper at the Society of Arts by one who has had vast experience of army signalling in peace and in war. I venture, therefore, to quote the words of Colonel Keyser as published in the *Journal of the Society of Arts*, 21st January, 1898. He says:—"It might afford a means of testing men for persistence of vision, and so save the instructors a great deal of time and trouble by weeding out men who would necessarily fail in the final examination, not for want of diligence or attention, but simply because they were physically incapable of ever making good signallers."

But it would seem that the subject should not only be tested under ordinary circumstances, but under all kinds of conditions, such as after fatigue. Perhaps those only should be selected whose persistence exhibits little fluctuation under a variety of circumstances. For instance, in the fatigue list, No. 4, being '821 before running, and 1'304 after running, would hardly be a fit subject for a signaller. A fitter one would be No. 8, being '659 before running, and '612 afterwards, combining a low degree of persistency with a not very great divergence under the two circumstances.

The possible modification of a signaller's capacity for persistence of vision after fatigue may explain unexpected deficiencies in signalling, which may have been in the past ascribed to indolence or carelessness on the part of an individual. This fatigue list seems to emphasise a necessity for signallers pointed out by Colonel Keyser in the discussion following Colonel Kennedy's paper on Army Signalling, 30th April, 1897. He says:—"I have always held that signallers should be carried if possible. You must remember that the work of a signaller begins after the marching is over. I have often seen signallers after a long and weary march, before they have been able to have a wash or have anything to eat, sent off at once to occupy a new post some miles away, and very often with a very stiff up-hill climb. I think all signallers should be carried in some way or another. Cycles, certainly where there are roads, or where it is suitable country, might be used. Of course, in a hill campaign like Chitral, or

some of the other Indian campaigns, it would be utterly impossible to use cycles, but there the signallers might be mounted on mules, or very small common bazaar ponies, which would not cost very much, and I am sure the extra work which you would get out of the signallers would more than repay the trouble and expense of mounting them."

But the fatigue tests show that it is not merely the relaxation of the mental energies, which always more or less accompanies bodily fatigue, that has to be grappled with. This may be overcome by a determined will and rigorous application. It is the alteration in the working of the retinal mechanism after exertion that has to be feared, for this may transform an apt and skilful signaller into one that is useless and an encumbrance.

Since signalling with flags is more fatiguing than signalling with lantern or heliograph, the former method of signalling would seem to tend to diminish the competency of the retina sooner than the latter. It would be interesting to hear the opinion of those who are practised in signalling, as to whether they have noticed that a difficulty in reading signals arises sooner with the flag method than with instruments merely manipulated by hand.

It is highly probable that many circumstances other than bodily fatigue also tend to alter the capacity of the retina for retaining the image. I have already mentioned that it is affected by illness, and, therefore, it is important that a signaller should be in good health. I consider the results of these tests as only the commencement of the research I have undertaken, and I have mapped out a programme of further tests, such as before and after retinal fatigue, under different climatic conditions, etc., which may be useful and of interest. I have been often asked whether I have not noticed that the mind can affect the duration of persistence of vision, and whether it is not possible to educate a defective retina up to the required standard. This is a difficult question to answer. We can track the vibrations produced by light on the sensitive layer of the retina through all the complex structure of that organ. From rods and cones it is conveyed to the fibrous layer, then along the fibres of that layer to the fibres of the optic nerve, then along the fibres of the optic nerve to the grey matter of the brain. There we lose the thread. In that grey matter of the brain, knowledge ends and conjecture begins. It is, however, conceivable that just as the retina affects the brain, so by a reflex action the brain can affect the retina. Perhaps it may be found that a person whose persistence appeared at first long may be educated to retain the image for a shorter period. There seems just a possibility that the Aerial Graphoscope may be used to educate the eye.

It has been suggested to me that in the case of testing soldiers with the Aerial Graphoscope it would be difficult to secure veracity of statement as to the precise moment a person sees the continuous image. That a soldier who was ambitious of becoming a signaller might wait to say he saw the continuous image until the lath was revolving fairly fast, even if

he had really seen it at a lower rate of revolution. There is always a possibility of deception in such a test as this, but I think it would be quite easy to guard against such deceptions; for instance, in my own tests, I have frequently tested the same person three times over. If, when tested under the same conditions, there is a discrepancy between the readings, it is a case for suspicion. In most of my repetition tests, however, the figures came out the same or nearly so, and I have every reason to believe the statements of the subjects were genuine.

In May, 1890, Lieutenant W. C. Crutchley read a paper before the members of this Institution "On a system of signalling between men-of-war and merchant-vessels," in which he pointed out the advantages which would ensue upon the adoption of visual signalling by the Morse code in the merchant service, especially in the case of large mail steamers. He pointed out that at that time there was absolutely no system of night signalling at all on our large ocean-liners, and only an inadequate means of signalling by day. This neglect has also been enlarged upon at this Institution by Lieut.-Colonel Harrison, who estimated that "thousands of lives and millions of property have been sacrificed in collisions" for the want of a system of night signals in the mercantile marine. I believe I am correct in saying that the present year shows no advance in this respect. I presume that the reasons urged would be that the selection and making of signallers is a process requiring too great an expenditure of time and energy. Possibly the knowledge that the process of selection can be simplified by scientifically testing the persisting capacity of the retina, may suggest that there is no longer an insurmountable barrier against every large liner having at least one competent signaller amongst the crew.

In making these suggestions, I have been especially anxious to avoid saying anything that might seem condemnatory of the Morse system of signalling, which has been brought to a high degree of accuracy and perfection. On the other hand, the facts before the meeting should rather elicit our admiration of those officers who have produced such excellent results in spite of the presence of so formidable an enemy as persistence of vision. In conclusion, I venture to hope that those in authority will think the method of testing for persistence of vision worth a trial, in case it may in practical working fulfil my hopes that it will lighten the burden of training signallers and bring visual signalling to a still higher standard of certainty.

TABLE I.—AERIAL GRAPHOSCOPÉ TESTS OF PERSISTENCE OF VISION.

Miscellaneous Group of Twenty-five Persons.

—	No. of revolutions per $\frac{1}{2}$ minute	gives	{ Persistence of vision in seconds.
1 M. - -	27* (self)		2·2
2 M. - -	27* (optical assistant)		2·2
3 F. - -	27		2·2
4 F. - -	27		2·2
5 F. - -	27		2·2
6 F. - -	37		1·62
7 M. child-	37		1·62
8 F. - -	27		2·2
9 M. - -	75		·8
10 F. - -	27		2·2
11 M. child-	27		2·2
12 M. child-	27		2·2
13 F. - -	41 (shortsighted)		1·46
14 M. - -	27		2·2
15 F. - -	27		2·2
16 M. - -	27 (sportsman)		2·2
17 F. - -	27		2·2
18 M. - -	92 (engineering student)		·652
19 F. - -	34 (shortsighted)		1·76
20 F. - -	72 (sister of engineering student with high record above)		·83
21 F. - -	40		1·5
22 M. - -	50		1·2
23 M. youth	27		2·2
24 M. child	34		1·76
25 M. child	36		1·6
Average 1·36.			Mean 1·19.
			* Mean of four readings.

TABLE II.—AERIAL GRAPHOSCOPE TESTS OF PERSISTENCE OF VISION.

Group of Twenty-six Boys before and after Running (First Readings).

—	Before running.			After running.		
	No. of revolutions per $\frac{1}{2}$ minute	gives	Persistence of vision in seconds.	No. of revolutions per $\frac{1}{2}$ minute.	gives	Persistence of vision in seconds.
1	52		1.15	38		1.58
2	66		.909	71		.845
3	44 (head boy of school)		1.363	53		1.13
4	73		.821	46		1.304
5	37 (third boy in 4th form)		1.62	32		1.87
6	65		.923	34		1.76
7	44 (top boy 4th form)		1.363	42		1.428
8	91		.659	98		.612
9	51 (middle boy in 5th form)		1.176	46		1.304
10	53 (5th Standard)		1.13	48		1.25
11	51 (nearly top of his class)		1.176	50		1.2
12	39 (top of Standard 5; very clever; best example I have had)		1.53	40		1.5
13	49 (fourth in 7th Standard)		1.22	42		1.428
14	54		1.1	56		1.07
15	74		.8108	53		1.13
16	57		1.05	57		1.05
17	50		1.2	47		1.27
18	82		.73	53		1.13
19	69		.87	73		.821
20	82		.73	42		1.428
21	58		1.03	63		.95
22	56		1.07	50		1.2
23	92		.65	67		.89
24	53		1.13	43		1.39
25	59		1.01	40		1.5
26	60		1	55		1.09

Average 1.05. Mean .98.

Average 1.23. Mean 1.07.
7 boys' persistence was lowered,
18 increased, and 1 boy the same.

TABLE III. — AERIAL GRAPHOSCOPE TESTS OF PERSISTENCE OF VISION UNDER WHITE LIGHT AND COLOURS. (FIVE PERSONS FEMALE.)

—	No. of revolutions per $\frac{1}{2}$ minute	gives	Persistence of vision in seconds.
<i>White Light.</i>			
1 - - -	63*		·95
2 - - -	70*		·857
3 - - -	36		1·6
4 - - -	51		1·176
5 - - -	36		1·6
Average 1·236. Mean 1·23.			
* Mean of three readings.			
<i>Red Light.</i>			
1 - - -	63*		·95
2 - - -	60*		1
3 - - -	36		1·6
4 - - -	46		1·304
5 - - -	73		·821
Average 1·147. Mean 1·1.			
* Mean of three readings.			
<i>Violet Light.</i>			
1 - - -	67*		·89
2 - - -	60*		1
3 - - -	28		2·14
4 - - -	60		1
5 - - -	60		1
Average 1·206. Mean 1·38.			
* Mean of three readings.			
<i>Green Light.</i>			
1 - - -	61*		·98
2 - - -	53		1·13
3 - - -	37		1·62
4 - - -	72		·83
5 - - -	39		1·53
Average 1·21. Mean 1·15.			
* Mean of three readings.			
<i>After being in the Dark.</i>			
1 - - -	51		1·17
2 - - -	59		1·02
3 - - -	46		1·304
Average 1·164. Mean 1·15.			

TABLE IV.—AERIAL GRAPHOSCOPE TESTS OF PERSISTENCE OF VISION.

Miscellaneous Group of Eleven Persons.

—	No. of revolutions } per $\frac{1}{2}$ minute }	gives	{ Persistence of vision in seconds.
1 F. - -	101*		·594
2 M. child	68*		·88
3 F. - -	96 (long sight)		·625
4 F. - -	46 (short sight with glasses)		1·304
5 M. - -	79 (signaller)		·76
6 M. - -	43		1·39
7 M. - -	71		·845
8 M. - -	56		1·07
9 F. - -	43 (always in perfect health)		1·39
10 M. - -	77 (with glasses)		·779
11 M. - -	70		·857

* Mean of three readings.

Colonel F. C. KEYSER, C.B. (late Inspector of Army Signalling):—As the lecturer has kindly alluded to me two or three times in his paper, I think that perhaps I might say a few words. First of all I should like to thank him very much indeed for the most excellent lecture we have just listened to, and which has been so ably thought out and so well prepared. I am sure it has been most interesting to all of us who take any interest in signalling, and although I am sorry to say that old age has turned me out of the coach, yet I still take a very deep interest in a matter which I had charge of a very few years ago. I really think there is a great deal in Mr. Bruce's system. I hardly see myself how we could work it out in a school of signalling; and I think perhaps it would be more useful at the hospital, where men might be sent up to be tested for their eyesight before they were allowed to join a class for signalling. It is heart-breaking work for a signalling instructor—I am talking of a regimental instructor now—to have to work for hours and hours for long weary weeks to turn men out as efficient signallers, and then to find out at the end of the time that his labour has been thrown away. Not, as I have said before, that the men have not taken the trouble to learn; they work hard and do their best, but they have not the sight for it. However long they work at signalling, although they know the details perfectly well, when it comes to practising at quick work they find their powers fail them, and they are no good as signallers. I have nothing more to add except to thank the lecturer very much. I am only delaying you from hearing my very able successor, Major Rhodes, who is on my right, and I know burning to give you his experiences, and as they are very much later and more developed than mine, I am pleased to make way for him.

Major E. RHODES, D.S.O. (D.A.A.G. for Signalling):—As regards the utility of this invention as applied to signallers, we are, of course, all agreed that one of the first requirements for a signaller is good eyesight, and by that we mean, not only long sight, but quickness of vision; that is, his eye-lens must have both rapidity and definition. Officers and non-commissioned officers previous to coming to the School of Signalling are tested for eyesight,

and a medical certificate is forwarded by their commanding officers to the effect that "the course of signalling they are to undergo at the school is not likely to be prejudicial." The test applied is the customary counting of spots held at a certain distance from the eye. Regimental signallers, though specially selected for qualities of intelligence, steadiness, etc., undergo no preliminary test for eyesight before commencing a signalling course; but any men who, after a few days' probation, do not come up to the average in reading, or intelligence, are returned to duty. This rough-and-ready way of determining the survival of the fittest is really no test of the special adaptability of the eyesight of the men that are left, as the rates of reading at this period of instruction being very slow, the advantage of the rapidity of the eye-lens does not yet make itself manifest, and probably later on, when the quicker rates of reading are practised, the men with abnormal persistence of vision will have to be eliminated. There is no doubt that a "signaller's eye" can be acquired to a certain degree by careful training and practice, in the same way that anyone without a special ear for music can attain a high degree of excellence in playing an instrument, but in both cases it takes considerable time and trouble. In the early stages of reading the lamp, beginners find a difficulty in distinguishing letters composed of similar elements, such as H, which consists of four dots, and S, which is composed of three; or V, three dots and dash, and U, two dots and dash; or B and D, their opposites. What they usually do is to read two dots when they should be reading three; three dots when four are sent, etc.; i.e., the eye fails to take in a dot. A battalion I inspected last year which had been trained to read with great accuracy on the flag, failed on the lamp because they continually omitted a dot in the reading of certain letters. This was not from want of practice, for their commanding officer had taken considerable trouble with the signalling of his battalion, and the result of the flag-work showed this to be the case; but they had been practising at too short a distance, about 200 yards, and when they were inspected at 500 they consequently failed. They missed the stronger illuminant, and could not adapt their persistence of vision to the longer distance. Another interesting point to notice in the lecture is the effect of physical exertion on the eye, but I am afraid we cannot pack our signallers in cotton-wool and only produce them when wanted; in fact, as a rule they are not even mounted. I had a letter from an officer with the Egyptian Frontier Field Force only the other day, describing how the signallers had on different occasions to send their messages, and then double after the column. If these men had been graphoscoped, I take it their records would have been interesting, and shown great eye disturbance. The *Times* of India mentioned the signallers in the Tirah operations as being the hardest-worked men in the expedition. From these facts it appears, that however detrimental the graphoscope may show exertion to be to the eyesight of signallers, there is no way of avoiding it for them, it can only be modified by mounting and brigading the signallers themselves. I think if the lecturer could produce for us an instrument which might be purchased for a few shillings, and by means of which regimental instructors could determine roughly the persistence of vision of their men, he would be conferring a great boon on the signalling service. Instructors would get an idea of those men who would be likely to read at the highest rates; they could devote more individual attention to those whose graphograms showed them to be not quite so apt, and, finally, they could reject at the commencement of the course those who failed to attain a certain standard. Another alternative would be, as Colonel Keyser suggests, to provide medical officers with the instrument for them to test every recruit, and record on his medical history sheet his persistence of vision. This would guide signalling instructors in making their selections for a class. I may add, that of the 67 officers who passed through the school in 1898, only six failed in reading. Of the 130 non-commissioned officers who passed through the school, only two failed to read the passing-out test, that is, 12 words a minute.

Lieut.-Colonel A. STEWART HARRISON (late 1st London R.E. Volunteers):— I do not think that this audience is quite aware of the immense importance of the issues at stake in connection with this lecture. You have witnessed in these experiments the death-blow of the Morse code for all purposes of visual signalling. That seems to be a very bold statement to make, and I will, with your permission, Sir, justify it. You are well aware that the Morse code has been in use in the Army and the Navy for over thirty years; that it was the refuge found by Lieutenant Colomb (now Vice-Admiral Colomb) from the chaos and confusion that constituted the "modern" signalling at the time he made his inquiry; that it was taken up without any idea of an accurate kind as to the persistence of vision. It was taken up as a last resort, and it was unfortunately foisted upon the Services by the mere fact that it was in connection with an "electric" cable. The Morse code is a series of dots and dashes made by sending a current through a magnet, and it was made by the tapping of the finger with a motion of something like the 16th of an inch. You find the Morse code parodied to-day by a man working a flag with a 6-foot pole, trying to make something like the same time as his compeer with an electric instrument. Now, what is the result, gentlemen? That at this moment the greatest naval Power in the world has no recognised means of communication between its mercantile marine commanders, and this has been going on for thirty years. You ask why do we not have this system applied to the mercantile marine? I will tell you. It takes three months of the most assiduous attention by the best men in the Navy to make a Morse code signaller. How are you to get these men into the mercantile marine? That three months is passed by the soldier and the sailor, receiving the pay of his country; do you propose that each officer in the mercantile marine shall give up three months' wages to learn signalling? The thing is preposterous! And now go a step further. Twenty officers shall enter, and only three shall pass. I appeal to the gentleman behind me who gave evidence in this room. I say that if you take twenty picked men from a regiment, you will only get three of these twenty to pass the tests that are imposed to make them "signallers." Now, I ask you, gentlemen, how long will the patience of the nation bear this? When the "Drummond Castle" was running on the rocks a vessel was passing and saw her. The captain of that vessel had not the slightest means of communicating with the "Drummond Castle." He saw her with her several hundred passengers and crew going to an absolutely certain death, and he had no means of warning them. Do not you think that the time has come when something ought to be done? What is it that stands in the way? Why, this preposterous system of signalling. Of course, you understand that I am a crank, as they call them in America. I have invented a system of signalling, and therefore I want my system adopted. But what we have first to do is to prove that the Morse code is miserably ill-adapted for the purposes for which it is required. With my system of signalling I will enable any person in half-an-hour to read signals, and will make an expert in a week. When you can get a Morse code to do that, keep it on. Until then, gentlemen, I condemn the Morse code—I think it stands self-condemned. The table the lecturer shows gives the persistence of vision in one man, in the best I think, it is '625, and in another '652. Take the average as '650, and you find that a man can receive impressions at the rate of 98 per minute. But in order to read 16 words by the Morse code you must receive 202 impressions per minute. Consequently the difference between 202 and 98 is to be found by the specialised gift of neglecting the consecutive image. The image is seen by the man with his eye, and we know it must be there, but his brain rejects it, and that is the reason you get very good signalling. That is a special thing, and it is admitted that out of a large number of men you will only find a few men who can do it. Now take another point. Fatigue, exhaustion, mental emotion, all these come in, when reading the Morse code, in the most disastrous fashion. In the system I propose there are a fixed number of points—

9. [The speaker here handed copies of diagrams to the audience. A copy of

this diagram is to be found in No. 249, p. 1246, of the R.U.S.I. JOURNAL for November, 1898.] Those diagrams a very child can read. The image remains, and there you have a system which the Board of Trade can take up, which they can compel every officer to pass in, and refuse him his certificate if he could not read it. In that way you would bring the mercantile marine to its proper position. That magnificent vessel the "Oceanic," which the newspapers went into raptures over the other day, will be commanded by a man and officered by men who will be utterly unable to communicate with other officers of other ships. It is perfectly possible that the captain of a vessel might meet the "Oceanic," and might know perfectly well that right in her path—she going at the rate of 22 miles an hour—lay an iceberg or a derelict, and the only thing he could do would be to make a flare, and make the "Oceanic" believe he was making signals of distress. Ought such a state of things be tolerated for one moment? Is it not the primary duty of members of Parliament when they next meet, in face of the facts which the lecturer has brought forward, to cause an immediate inquiry into the efficiency of the present system of signalling? And it is perfectly useless asking soldiers to do it. The soldier who is fond of experiments is the man who never gets on. The naval officer who tampers with signalling will be kept always low on the list. The mercantile marine officer suspected of a desire to perform experiments will never get a ship as long as he lives. Who is to do it? Parliament must appoint a Commission, unprejudiced, fair-minded, and scientific, to investigate it. I have said that thousands of lives are sacrificed in collisions because the captain of one vessel does not know what the other is going to do. Parliament must make the inquiry, and then the yachtsmen of England, with their wealth, intelligence, and courage, can carry out the scheme until it becomes practical, and then within the next five years a woman may see her husband go away on a ship with the certainty that he will not be run on the rocks by the ignorance and incompetence of the officers to whom she has entrusted his safety.

Vice-Admiral Sir NATHANIEL BOWDEN-SMITH, K.C.B. :—I had not intended, Sir, to join in this discussion, had it not been for the attack just made by the last speaker on the Morse system. The lecturer introduced the Morse system, and spoke in praise of it. At the present moment the Morse system holds the field, and it has been in existence for some thirty years in the Army and Navy, and also used by the Post Office. Although it is the system used by the Army and the Navy and the Post Office, and although we have all used the same signs for the letters of the alphabet, there was a time when we used different signs to express the numerals. Now, however, I believe I am right in saying we all use the same signs for both. How, therefore, if all these Services are using this system of signalling, and with very fair success, can it be with justice so severely condemned? The reason why sometimes at night there is a difficulty in taking in a signal, is because the signalman will operate too quickly, and the lecture I have just heard, showing the difference in the retentive power of the eye in various persons, explains the reason why there should be a uniform length in the long and short flashes. We will take the case of my own Service, the Navy. A small cruiser, which has been some time detached, joins a fleet at night, and the flag-ship commences flashing at her, the signalman operating very rapidly. The unfortunate signalman on board the cruiser, who is not so quick through want of practice, does not take it in readily; whereupon the flag-ship man, to show his smartness, and finding that his poor colleague on board the other ship is in difficulties, makes the signals faster still. There should be a uniform length in the long and short flashes. The advantage of the so-called Morse code, which was introduced into the Navy by Admiral Colomb, is that it can be worked by sight or sound; you can use it by night or day, in thick weather as well as in fair. The last speaker, I think, objected to it on the plea that it took a soldier three months to learn the Morse system, and I may say that it takes an ordinary seaman about the same time; but I don't think three months is a long time to learn a system of

signalling. As regards the mercantile marine, I agree with the last speaker that there is no organised system at present whereby vessels can communicate with each other during the night. We have magnificent ocean steamers crossing the sea, and yet they cannot speak to each other at all by night, and only very slowly during daylight with flags, which is a slow process, and if there is no wind will not blow out. During the night they may pass, but cannot speak to each other, even though one may be in serious trouble. The only thing that will bring signalling about is a general demand on the part of the public. The sole requirements for this signalling are a lantern and one or two signalmen—two men would be best, but one would suffice. You must remember that besides the lantern you can make your signals by sound, using the steam whistle or other instrument. The mercantile marine do not, I suppose, carry signalmen on account of the expense. But the expense would be trifling. There are plenty of time-expired men from the Navy who have learned signalling, and who would be quite ready to serve on board vessels as quarter-masters or able seamen, and act as signalmen for a small daily allowance in addition to their ordinary pay. With a signalman on board our mail steamers, they might talk to each other whenever necessary. It would make travelling more popular, and enable passengers to obtain news in the day-time by semaphore, which is quicker than the Morse, but it will only be brought about by the general demand of the travelling public. I think we are much indebted to Mr. Bruce for his interesting paper, which will doubtless be read by many officers in various parts of the world, and I can only express my regret that there is not a larger audience to witness his illustrations.

Lieut.-Colonel ALLAN CUNNINGHAM (Royal Engineers) :—This very interesting lecture, Sir, brings before us the possibilities of illustrations from other branches of sensation as well as that of sight, and as I think that what has been said about persistence of vision is to some extent to be explained by an effort of memory, as well as by real persistence of vision, I will just draw an illustration from another branch of sensation. Take the case of feeling; it is said to be the bluntest of our sensations. We have heard lately, for instance, a great deal about pin-pricks. Well, it takes a little time after a prick before any sensation is felt at all; a still longer time before the sensation of pain is aroused. A certain physiological change occurs, I suppose, in the structure of the skin and flesh and nerve, and the transference of the sensation to the brain. When the exciting cause is withdrawn that state of change of structure still remains, and the sensation goes on. That corresponds with the persistence of vision—it is a persistence of feeling. After a time I suppose the structure returns to its normal state. Then, properly speaking, I suppose we ought to say the sensation has ceased, but we still have the memory of the pain lasting for a little time, but probably by an effort of will that can be shortened and overcome. With regard to the sensation of vision,—by these beautiful experiments here we see that after a thing has been actually withdrawn from the eye some change has taken place in the structure of the retina, either chemical or physiological, and the sensation of that vision remains for a time. These sensations are fleeting. People talk of fleeting impressions and lasting impressions, but we see by these figures that visual impressions last for a considerable period, quite long enough to be measured, and the *memory* of them probably lasts a little longer; but the duration of this mental impression is capable of being shortened by an effort of the will. The figures on the tables are very interesting indeed, as showing the great change that has come to pass in our notions of the duration of visual impressions. It used to be said in the days of long ago that the perception of a thing lasted for about the tenth of a second, and that it was necessary for fresh impressions to succeed each other at intervals of a tenth of a second, in order that a series of impressions might blend together to form a whole picture. The cinematograph, which is the best illustration of this, I suppose, would lead one to believe that the persistence of vision must be less than the tenth of a second. But I am quite sure

that in that instrument the succession is far more rapid, and there is no doubt those who exhibited them would not make them unnecessarily rapid, because the films are very expensive. Here we have in the table the impression lengthened up to over two seconds; a great many figures show two and one-tenth seconds. The lecturer has spoken about the application of his invention to army signalling, to test the capabilities of men whom it is desired to train as good army signallers, as if the persistence of vision was the only point, or one of the principal points, to be taken into consideration. But I should think that acuteness of vision is also equally important. The acuteness of vision which will take up a thing and not require it to be too long before the eye before the eye takes the impression in as a real recognisable visual impression, is a very important thing, as well as to have the quick effacement of that impression after the exciting causes are withdrawn. I speak with a good deal of interest in connection with army signalling, as I was one of the first to introduce army signalling into India; for only a short time, it is true, I was connected with the work of army signalling instruction, but I was one of the very first. I should think it would be a thing very easily and quickly tested, to have a hundred men tested once for all before they were put into the army signalling class, and then have the result tabulated after they had passed the army signalling class compared with the figures which had been obtained by this instrument. I think the lecturer has only produced two or three instances of army signallers. By having about a hundred men tested before they went to the class it would be very soon set at rest whether this is a good and sufficient test or not. With reference to the Morse system, I should like to say something in defence of it. It is really a very useful system, and it needs very little to put it into use. Anything whatever will do. The flag-signaller may have lost his flag, but his handkerchief will do just as well for short distances. His hat would do almost as well, and even his hand. The commonest lamp will do for short distances when the proper appliances are not at hand. The rough-and-ready things that may be used for the Morse system makes that system a very useful one. Then, the fact that there is a whole army of trained civil telegraphists available everywhere, every one of whom could be turned, if needed, into army signallers in a very short time, is another advantage. They all know the Morse system, and it requires only a short additional training to enable them to take up the military flag and lamp system of signalling. There is one thing noticeable about the figures shown on those rotating laths: they have a surprising effect of solidity. The apparent disc must be nearly plane (when the lath is sufficiently rigid); and yet, when the picture thrown on the lath is a statue, the effect of solidity is really very wonderful, and it is difficult to believe one is looking at a single image, and not at a pair of images prepared for binocular vision.

Mr. A. O. GRANGER, of Philadelphia (late United States Army):—I am a stranger here, and do not know whether it is proper for me to speak or not. My experience in connection with signalling has been rather limited. It was confined to observations during the civil war in the United States, when I was connected with the Union Army at General Sherman's headquarters on the march to the sea, and other campaigns. While the subject has been very fully covered here this afternoon, yet there is one rather minor point which I should like to emphasise in connection with the very interesting paper that has been read, and that is the necessity in the Army of having signalmen carried—not to have them go *tramping* 15, 20, or 30 miles a day. They should in every case be mounted. In the Northern Army, during the war in America, the signalmen were all mounted the same as the cavalymen. It seems to me very desirable indeed that they should be mounted or carried in some way, and the importance of accurate signalling is so great that if it is necessary that the men should be "put up in cotton-wool" to produce them at will, then even that should be done. That signalling is an extremely important thing we all know who have been connected with an Army in

time of war, and while the point I am discussing is a minor one in Mr. Bruce's paper, yet I know from experience and observation that it is necessary to have the signalmen in good physical condition at the end of the day's march.

Major A. GLEN (14th Middlesex (Inns of Court) V.R.C.):—I have had, Sir, some little experience in the training of Volunteer signallers with Colonel Keyser and others, and I appreciate the advantage, both to signalling instructors and those who may otherwise waste their time unprofitably in the endeavour to learn signalling when they cannot do so, of an instrument such as Mr. Bruce has suggested to us, which would tell us beforehand whether a man is going to turn out a good signaller or not. It would be of great advantage. But I confess he has not yet altogether convinced me that the test of persistence of vision is necessarily the test of whether a man would make a good signaller or not. There is a figure in his table which perhaps induces me to have some doubt on the subject. I notice that in Table IV., No. 5, who was described by Mr. Bruce as a highly trained signaller, had his persistence of vision destroyed at 79 revolutions in a half-minute. That fact means that when the lath went faster than 79 revolutions a half minute, the image of the lath was blurred and he obtained a persistent image. The lath having two ends, for each revolution there would be four apparitions in a given spot of a piece of white lath. Therefore that figure 79 seems to me to mean that the signaller has the blurred image when he gets up to about 320 distinct impressions in the course of a minute. Now in signalling at the rate of twenty words a minute, there are 360 elements of dots and dashes. Major Rhodes will correct me if I am wrong.

Major RHODES:—873 units. There are 78 letters, and therefore 873 units.¹

Major GLEN:—I am much obliged. I had forgotten it was so many as that. Now it seems to me that if the most highly trained signaller gets over 800 impressions of elements in the course of a minute, the persistence of vision which disappears at 320 elements in a minute has really nothing to do with his power of signalling at all, because it is obvious that his impression of the signalling at that pace or beyond that pace will be a blur. His persistence of vision will run the signals of the flag or lamp, or whatever it is, all together. Moreover, one's own experience is that in lamp signalling, or signalling with the heliograph, as long as a single word is being read, there is really a perpetual light in sight. The light does not appear and then go out, so that you see a blackness and then light again afterwards; there is a continuous light with a flickering in it that you have to appreciate, and it is that flickering that enables you to read the signals. For those reasons I feel a little bit doubtful, and I should be glad if the lecturer would explain the matter perhaps a little further as to how this persistence of vision is a test of a man's capacity for appreciating that flickering in the light or the movement of the flag.

Mr. BRUCE, in reply, said:—Amongst the many suggestive remarks which Major Rhodes made, there is one I should just like to speak about. As the principle of the revolving lath is so simple, there is no doubt a rough apparatus could be produced at a very reasonable cost for the purpose of placing in the

¹ There was a misunderstanding here. I was speaking of "elements," and Major Rhodes of "units." There are only 246 elements in twenty words, that is, a signalling lamp will give 246 flashes (some short and some long) in signalling twenty words (or three alphabets, or seventy-eight letters). But whether the number of distinct flashes per minute be taken, or the proper interval between them, namely, three units, the figures support the lecturer's suggestion; for they show that a message flashed at the rate of twenty words a minute, would have appeared blurred to Nos. 4, 6, 8, and 9 on Table IV., but not to the signaller, No. 5.—A. G.

hands of signalling instructors. The instruments with which I have taken my tests were made to run very accurately. To prove their accuracy I may say that the tests came out time after time at the same reading. Of course, some expense was incurred in getting such smooth and accurate running; but if only a rough apparatus is wanted it can be produced at a very reasonable cost, as the principle of the invention is simple. Concerning Colonel Harrison's remarks about the Morse system, I have already expressed my opinion that I think the Morse system has done admirable work. For myself, I am not likely to be very much opposed to the Morse system, as I have an invention for signalling, viz., my electric signalling balloon, which is based entirely on the Morse system. In a signalling balloon the signals are necessarily slower than with the lantern, flag, or heliograph. The incandescent lamps inside the balloon take a certain time to incandesce, rather tiresomely long, and it makes it necessary in practice to go about four or five words a minute. I do not think in that case persistence of vision comes in at all. I think even if it were necessary to go as slowly as that in all signalling, I should say go slowly and keep the Morse code. I do not, however, think it is necessary to go as slowly as that except in balloon signalling. The slowness in the case of balloon signalling has been rather urged against my method, but I have always maintained that the great point about balloon signalling was the altitude. There are many cases where a forest may come between two signalling parties and you cannot get the altitude in ordinary signalling, and you have, perhaps, to build something up. But in balloon signalling where you can raise a balloon 500 feet or more, it is possible to get to a useful altitude. Therefore, I have always urged that slowness was not a very great disadvantage compared with the alternative of not being able to send a signal at all. At any rate, I do not think in the case of slow signalling with the Morse code, persistence of vision would come in. If it is only a question of speed, it is better to retain the Morse code, than not to have it at all. Concerning some remarks of Colonel Cunningham, I think he spoke about the length of the duration of persistence in the cinematograph. It is very short, of course. It necessarily would be much shorter in the cinematograph than in the aerial graphoscope, for this reason, because the light has to go through the films, whatever the films are made of. The films obscure much more light than the glass slides which are used with the aerial graphoscope. The lantern here is very near the lath, and a very brilliant light is inside the lantern, and that is why the figures in the tables are generally high. If the light in the lantern had been turned down to half its candle-power, you would have seen a great difference in the readings of those tests; 2.2 is a high figure to quote for persistence of vision. I think the effect of solidity which Colonel Cunningham has mentioned is certainly very striking. The figures appear to stand out in relief. I think it is partly a mental effect, as the subject stands out, as it were, from a background, and all the slides which I have shown this afternoon are blacked in, which helps to bring out the effect of relief. As regards Major Glen's remarks about the flickering, flickering is an effect of persistence of vision. The simple experiment with the candle showed that the image of the candle is always on the eye, even when the hand comes in front of it—it remains on the eye from persistence of vision. It is really a discrimination between the incidental image, and that is the nice point. I showed you that upon the lath when I covered up the blackened centre with a piece of white paper. You saw the difference then in the middle of the picture. The picture was practically spoiled because of the difference between the real part and the visional part which is not really there. The latter is the persistent part, and therefore in the case of a signaller he has really got a nice point to discriminate, as to where the real begins and the persistent ends. Therefore, those who have the persistence very long are likely to muddle up signals more than those who have it very short.

The CHAIRMAN (Sir Andrew Clarke):—I think I shall be anticipating your wishes, and especially the wish of the Council of this Institution, in offering to Mr. Bruce

our thanks for his interesting lecture. This lecture has, to my mind, a double significance. First of all to our soldiers and sailors the question of signalling is nowadays becoming a very important one, and as progress is made in war this matter will become of still greater importance. The presence here to-day, and the part taken in the discussion on this paper, of Major Rhodes, who is primarily responsible for the efficiency of the signalling staff of the Army, I think we may assume, indicate the interest the Head Quarters Staff take in this subject, a subject second to none in these days of long ranges and smokeless powder, of the various factors which go to the creation of a modern Army properly equipped to command victory. The other point is that we rather welcome in this hall those of our civilian brethren who are devoting their abilities and their time and their means to measures connected with the defence of the Empire. Therefore I think I shall be meeting your wishes when I convey to Mr. Bruce the most cordial thanks for his very interesting lecture. I have known him, I think, now for fifteen or sixteen years, working on this subject, and I hope this expression of our recognition of the good work he has already done will encourage him to continue that work. I perhaps owe an apology to this meeting for allowing a question to be discussed which was not exactly before us, but I cannot help thinking that the remarks which have fallen from Colonel Harrison, and the reply from Sir Nathaniel Bowden-Smith, may be of benefit. If it will not lead to the adoption of the system of my friend, it may be of good in improving the Morse system, which he so strongly condemned. I will not detain you any longer, but just ask you to authorise me to offer our thanks to Mr. Bruce for his very interesting lecture.

CHARLES XII.'S TREATMENT OF LIEUTENANT-GENERAL BARON PEIKEL.

By CHARLES DALTON, Esq.,

Editor of "English Army Lists and Commission Registers, 1661-1714."

BARON PEIKEL (or Pykul) has been mistaken by several writers for his kinsman the better-known Count Patkul, the famous Livonian patriot, who was executed, after being mercilessly broken on the wheel, at a village near Casimir, in Great Poland, October 10th, 1707, by order of Charles XII. The confusion occasioned by the similarity in names may also be traced to the remarkable fact that both Peikel and Patkul held the rank of lieut.-general in the Polish Army; and the former succeeded the latter in command of the Saxon contingent which fought on the side of Augustus, King of Poland, against Charles XII. Fate decreed that both Peikel and Patkul should fall into the hands of the iron-hearted King of Sweden, and after a long imprisonment be executed within a few months of each other. Here the parallel between these two Livonian patriots stops, as Peikel was neither a great commander nor a diplomatist, but he possessed one remarkable talent which alone makes him intrinsically interesting and worthy of a niche in the Temple of Fame. Baron Peikel claimed, and was allowed by impartial and trustworthy witnesses, to have discovered the secret of making gold!

The Province of Livonia, which had been a bone of contention between the northern countries of Europe for centuries, was ceded by Poland to Sweden in 1660. The confiscation of Livonian estates, and the heavy taxes imposed by Charles XI., alienated the Livonian nobility and people from Sweden and Swedish rule. The sympathies of the conquered province were with Poland, and thus it came to pass that when Russia and Poland engaged in war with Sweden, in 1700, some of the leading Livonian noblemen were found ranged against Charles XII., whose proclamation summoning them to return to their allegiance was treated with open defiance. Prominent among the Livonian revolvers was Baron Peikel, who sided with Augustus II., King of Poland and Elector of Saxony. Passing over the fluctuating fortunes of the Polish arms under Augustus the Strong (who was deposed in 1704, but re-elected some years later to the Polish Crown), we find that a battle was fought near Warsaw, in the summer of 1705, between the Saxons and Poles on one side, and the Swedes on the other. In this engagement the Saxons are said to have fought well, but not being supported by the Poles, who fled on the first discharge, had to retire. The loss on both sides was

equal. General Bond (the Swedish commander) was killed, and Baron Peikel (the Saxon general) was taken prisoner.¹ Peikel and several other Saxon officers taken on this occasion were sent to Stockholm, where they suffered a rigorous imprisonment.

In November, 1706, a treaty was concluded between Charles XII. and Augustus II. The cessation of hostilities only hastened Peikel's doom. He was tried by the Advocate Fiscal in Stockholm as a traitor to his country, and being found guilty was sentenced to death. On the face of the evidence against Peikel, this sentence was doubtless a just one. But the prisoner had a strong argument in his favour against his condemnation, as appears from a contemporary MS. :—

"Peikul (*sic*) happened to be born in Poland about three miles from the Livonian border, and this fact was used against him in a law-suit he had with an uncle for a considerable estate. After going through all the Livonian Courts it was, as is customary, brought to the King for decision, for to him is the last appeal in all civil causes. The King gave judgment against Peikul for this only reason because he was an alien and not his natural-born subject. However, this determination, unjust as it was, afterwards was brought as a good argument for Peikul against the King, when his Majesty condemned him as a natural-born subject of Sweden. But it seems, though his being born out of the King's dominions proved a good reason for depriving him of his estate, it proved ineffectual to the saving of his life."²

The sympathy of the Queen of Sweden (who was acting as Regent of the Kingdom during her grandson's absence with the army), her ineffectual efforts to obtain a pardon for Peikel, the condemned nobleman's extraordinary offers to the Queen and Senate for filling the Swedish Treasury, then at a very low ebb, provided his life were spared, and the remarkable proof he gave before witnesses of his ability to perform what he promised, are fully and graphically detailed by the British Envoy³ at Stockholm in his official letters to the Right Hon. Robert Harley, Secretary of State :—

Mr. Robert Jackson to the Secretary of State.

6
"Stockholm, January 5th, 1707.

"An order is now come from the King to suffer all the Saxon officers now prisoners in Sweden to go where they please, except one Lieutenant-General Pykull (*sic*), a native of Liefland [Livonia], who was taken about two years ago in Poland, and in November last was condemned here as a traitor for serving against this Crown, which sentence the King not only

¹ Luttrell's "Brief Relation of State Affairs," Vol. V., p. 581.

² Extracted from "A short narrative of the life and death of John Reinhold Count Patkul, a native of Livonia, etc., translated out of High Dutch MS. by Viscount Molesworth, 1717." (Somers's Tracts by Scott, Vol. XIII., pp. 873-892.)

³ Mr. Robert Jackson was appointed British Agent to Sweden, February 9th, 1703. He succeeded Mr. John Robinson as Envoy, whom Queen Anne appointed Bishop of Bristol, from which diocese he was translated to the See of London in 1713.

lately confirmed, but gave also at the same time express order for his execution as on the 7th instant; but the Queen-Mother and all the Royal family here having interceded for him, and not yet got his Majesty's answer, her Majesty has therefore by her own authority reprieved him for a month, yet it is thought his pardon will not be granted at last."¹

Mr. Robert Jackson to the Secretary of State.

6

"Stockholm, January 30th, 1707.

"The King has renewed his former orders for the execution of Lieutenant-General Pykull, not having thought fit to hearken to the Queen-Mother's intercession on that gentleman's behalf."

Mr. Robert Jackson to the Secretary of State.

6

"Stockholm, February 9th, 1707.

"The Saxon Lieutenant-General Peikel was beheaded on Monday last; he chose to be executed with an axe (though it be esteemed very dishonourable in this country) rather than with a sword, by reason of the unskilfulness of the executioner. There was no other crime laid to his charge in the Fiscal's accusation than that he, being a native of Liefland, presumed in disobedience to his Majesty's avocatoria² to serve his enemy, wherefore it was thought here that the King's neither hearkening to the many high intercessions made on his behalf, nor the advantageous proposals he made to save his life, proceeded from the knowledge his Majesty must have of some other crimes of a blacker nature. But the morning Peikel suffered he told the divines which assisted him, and administered the Sacrament to him, that having heard of a report spread as if he had been one who had particularly encouraged King Augustus to begin this war, on the prospect of the Lieflanders, his countrymen, revolting from Sweden; and also of another that he had been engaged in a design upon the King of Sweden's person, he therefore took that opportunity to declare in that solemn manner that all such reports were false, and that he never had acted anything against his Swedish Majesty's person, or Kingdom, contrary to the principles of a man of honour. And since his one crime was that he was born in the Swedish dominions, he could not allow to have deserved death merely for that reason. But he added that it having pleased God some time ago to bring him wonderfully to the knowledge of a great secret in Nature, whereby he could not only himself have lived in the greatest happiness, but likewise have been capable of doing much good in the world. Yet he nevertheless suffered his ambition to prevail against his reason, which led him to accept the command of those troops amongst which he was taken prisoner, and for that he said he had justly incurred the punishment which was to be inflicted on him. The secret he speaks of was making gold to a prodigious

¹ This and the succeeding letters from Mr. Jackson are copied from the originals in the S.P. Sweden at the Public Record Office.

² Royal Proclamation for all the King of Sweden's subjects to return out of foreign service.

advantage; and he actually gave such proofs to the archiater at the Court, as well as some other knowing persons, of his profound knowledge in chemistry, that nobody now doubts of his having been able to perform what he pretended, and also proposed in case the King would have given him his life; and for your Honour's curiosity I shall presume in my next humble account to send your Honour an extract of the said proposals (whereby, if he could have fulfilled his promise, would have arose a yearly revenue of five hundred thousand ducats¹ to this Crown), and also an authentic relation of an experiment of his having had that secret performed by the Advocate Fiscal, and one Colonel Hugo Hamilton, a native of Ireland, who is Commandant of this city, and had the custody of Monsr. Peikel during his imprisonment, which papers being but lately come to my hands I have not yet had time to translate them."

Mr. Robert Jackson to the Secretary of State.

6

"Stockholm, February 16th, 1707.

"Having in my last presumed to mention several things relating to the lately executed Baron Peikel, I therefore now further presume to transmit, along with this, the translation of his proposals together with Colonel Hamilton's relation of the experiment he made, both which papers I humbly take the liberty to beg may be managed with a little secrecy for fear of injuring some persons here, who are thought to have employed themselves too much in favour of the said Baron."

Translation of the extract of Lieut.-General Peikel's proposals to the Queen and Senate.

"That it having pleased God to bless his study and labour for bringing him to the knowledge of a great secret; and he now laying under sentence of death was willing, in case he could thereby save his life, not only to reveal the said secret to any one person, to be under an oath of secrecy, whomh is Majesty should think proper to appoint, but would likewise oblige himself to make at his own charge this year four hundred thousand ducats for his Majesty; and in case he performed not he then desired no mercy, but that not only the punishment of death might be inflicted upon him by virtue of the sentence lately pronounced against him, but that also there might be added any further punishment, as a just reward, for his demerits in presuming to abuse his Majesty. He further obliged himself to make yearly, so long as he lived, the same quantity of gold for the King's use, his Majesty building only a proper house for carrying on the work, and being at the charge of providing materials, and maintaining the servants which should be found necessary to be employed therein, the whole charge of which he computed would not amount to twenty thousand ducats yearly.

"When he had performed what he thus proposed two years he then desired to have a reasonable enlargement, but in the meantime to be

¹A gold ducat was equivalent to nine shillings and sixpence.

under the strictest confinement that was possible, and besides he would bind himself by the most solemn oath never to endeavour to make his escape, neither during the time of his confinement nor when he should have his liberty; and for further security he would forthwith dispose of his estate in the Brandenburg country and buy other lands of like value in Sweden and establish his family here.

"And to confirm the probability of his being able to perform what he proposed, he desired that Colonel Hugo Hamilton and the Advocate Fiscal might be commanded to give an account of the experiment they were eye-witnesses to, or rather had themselves performed by his directions, he only having now and then been present during the operation. The whole charge of which operation cost not above twelve crowns and yet produced the weight in gold of forty-nine ducats, and the officers of the Mint attested the gold to be perfectly fine as any they ever saw.

"These proposals were presented along with a petition to the King, January 4th, 1707."

Translation of Colonel Hugo Hamilton's relation.

"To the Queen's Majesty most humble relation:—

"Whereas Peikel, who lies under the sentence of death, has, in all humility, informed your Majesty of his having the knowledge of making gold and likewise offered to reveal the said secret, agreeable to what I also in all humility lately had the honour to acquaint your Majesty; wherefore in obedience now to your Majesty's most gracious commands that I should in writing give a further humble account of that matter, therefore with the same humble intention for the service and advantage of my most gracious Sovereign as in all humility I formerly represented, I do now, by the oath and duty wherewith I am bound, declare that when Peikel first intimated to me his having that secret I suspected the truth of it a long time, and looked on his making me that confidence as a design he had the better by one means or other to make his escape. Wherefore I also took care to have him the better guarded; but he several times after repeating the matter, and withal offering in my presence to make a proof thereof, to convince me that what he said was a real truth, I thought that such an opportunity of serving my most gracious King ought not to be neglected, and therefore I asked him if he was willing that I might take a second person to be also present, whereto he agreeing I thought none could be more properly employed than the Advocate Fiscal, Thomas Fehman, his accuser, whom, Peikel approving of, I acquainted the said Advocate Fiscal therewith and requested him to be a witness at the operation, who thereupon expressed himself that in case there was any reality in the thing he could not be a faithful subject who would not endeavour to forward so important a work; yet for his own person he was unwilling to be concerned therein lest he should thereby incur too many undeserved censures, however I importuned him till he at length promised to be present. I forthwith permitted Peikel to begin the operation, which he did by dissolving of a powder of mineral antimony and winestone from Montpelier; this was set forty days in

digestion, and afterwards was burnt with a prepared spirit that produced a greyish-coloured metal, which being beaten to powder was likewise set forty days in fermentation; when that time was expired it was taken out and mixed with powdered common antimony, brimstone, and a little lead, and was afterwards melted in a melting-pot and cast into a pot of brass metal, at the bottom whereof it left a weighty and substantial white metal, which being afterwards again melted in a melting-pot produced the same pure and fine gold that I showed your Majesty; and lest that any other than the true powder should be conveyed into the said pot, the Advocate Fiscal and I did by ourselves make the experiment, and found that the like quantity of the powder by us weighed produced the same effect as when Peikel was present. I must acknowledge that during this operation I always suspected some deceit would be therein practised, and therefore more narrowly observed everything that Peikel undertook, as did likewise the Advocate Fiscal, whereto we frequently admonished each other. And whereas the best opportunity to practise the deceit seemed to be by conveying gold among the common antimony wherewith the chemical prepared powder was to be mixed, I therefore directed Peikel, the evening before, to weigh the same, but when he was gone I cast it away and took the same quantity of other common antimony, and the effect the virtue of the other powder produced both the Advocate Fiscal and I were witnesses to; and I do further declare upon my salvation, and the disfavour of my most gracious Master, that I do firmly believe, and do not otherwise know, but he the said Peikel is really possessed of the knowledge he pretends, and this the Advocate Fiscal must likewise, as a faithful servant of his Majesty, confirm whenever he is called upon. It was further between us agreed and resolved on, according to the oath and duty wherewith we are bound, to make a discovery of this affair, whatever sentence Peikel should receive; that this has thus been transacted I own, but the great secret, which consists in a very small composition, and which he prepared in an hour's time, and is laid at the last melting amongst the other powder, I neither know, nor desire to know, it only having been both our sincere intentions to promote what we judged might conduce to the advantage and service of our most gracious King."

(Signed) "HUGO HAMILTON."¹

The refusal of Charles XII. to entertain the proposals made to him by Baron Peikel, or to allow the Queen Regent's intercession to turn him aside from his fixed resolve, does not in any way throw discredit on Peikel's honesty of purpose or belief in his ability to carry out what he had undertaken. Charles's utter recklessness where money was concerned is a matter of history. When this monarch ascended the throne in 1697, at the age of fifteen, he found a full treasury and the country at the height of prosperity. In a few years' time the treasury was well-nigh exhausted, and Sweden was engaged in

¹ The above declaration is endorsed:—"Col. Hugo Hamilton's relation concerning Lt.-General Peikel. From Mr. Jackson's letter of Feb. 16, 1706/7 Recd. March 7." S. P. Sweden

a gigantic struggle with Russia. Any other monarch, at the period in question, would have taken Peikel at his word and put him to the crucial test. Had the promised gold not flowed from Peikel's crucible, Charles could have satisfied his own revengeful spirit by putting Peikel to death in the same barbarous manner that disgraced the execution of the unfortunate Count Patkul. The Lutheran minister who attended Patkul in his last hours, and who wrote a MS. narrative of the Count's chequered career and miserable death, has left on record the following anecdote regarding Baron Peikel, which story, if true, leaves an indelible stain on the character of Charles XII. whose many noble qualities were marred by an implacable spirit which neither knew how to forgive nor how to forget.

"After King Charles had entirely got the better of Augustus (King of Poland), and the latter was forced to comply with everything required of him, Augustus, in order to put the best face he could on a bad matter, made great entertainment for the King of Sweden at a very fine pleasure-house not far distant from Dresden. Peikul's poor lady and children had taken a great journey from Stockholm, on purpose to solicit for her husband's pardon; and King Augustus with his courtiers, as well as several of the King of Sweden's officers, had promised her to make use of the utmost of their interest in his behalf; and had contrived the matter so, that after the usual jollity and good humour, caused by a great feast, she, with her children, should unexpectedly come into the dining-room, and fall at the King of Sweden's feet, imploring his mercy for her husband; to which King Augustus, with all the other noble guests, were to join their intercession. So far matters were well concerted; but the King of Sweden, having by some means or other got an inkling of this design, after he was come to the place appointed for the feast, and being resolved that nothing should prevent his intention, desired leave to retire for a few minutes before dinner, into a private closet, where he called for pen, ink, and paper, and wrote and signed an order which he sent by express for Peikul's immediate execution upon receipt of it. After this he came out to dinner, which being ended, the poor woman and her children came in and flung herself at King Charles's feet, as it had been forecasted, in the midst of the mirth, King Augustus with all the company mixing their intercessions with her tears. The King of Sweden, after some seeming struggle, granted the pardon which was desired, and signed an instrument to that purpose, which by Peikul's friends was presently despatched away. But the King's courier arrived first at Stockholm, and poor Peikul was beheaded about four hours before the second got thither."

¹ "A short narrative of the life and death of John Reinhold Count Patkul, a nobleman of Livonia, etc., written by the Lutheran minister who assisted him in his last hours; translated out of High Dutch MS. by Viscount Molesworth, 1717." (Lord Somers's Tracts by Scott. Vol. XIII., pp. 873-892.)

Voltaire tells us in his "History of Charles XII." that when King Augustus (whose Saxon subjects had been heavily subsidised by the Swedish monarch) heard that Peikel had been executed, he said "he did not wonder that the King of Sweden had so much indifference for the Philosopher's Stone as Charles had found it in Saxony."

Baron Peikel's great secret died with him. By his own showing he had expected the greatest happiness from his chemical discovery, but the path he pursued was not the "golden mean" which Horace recommended when he wrote the lines:—

"Auream quisquis mediocritatem
Diligit, tutus caret obsoleti
Sordibus tecti, caret invidenda
Sobrius aula."

THE OFFICIAL REPORT ON THE SALISBURY MANŒUVRES IN 1898.

THIS Report¹ on the first manœuvres held since the passing of the Military Manœuvres Act will be keenly criticised by many readers, civilian and military, and its conclusions carefully compared with the opinions freely expressed by many actors in and spectators of the greatest military assembly since 1871.²

The Report begins with the Commander-in-Chief's own Report to the Secretary of State, which is followed by those of the commanders of the Red and Blue Armies, the Inspector-General of Cavalry on the independent cavalry exercises, and the Chief Engineer on the watering arrangements. The General and Special Ideas with narratives and remarks follow, and then the technical reports—engineer, transport, supply, and railway,—the report of the Military Manœuvres Commissioner, and, in conclusion, the field state of the great review.

As Lord Wolseley says, the manœuvres included three distinct periods:—

1. The Cavalry Exercises, 1st July to 27th August.
2. The Drills, 15th to 31st August.
3. The Manœuvres, 1st to 8th September.

The last period was that on which the public gaze was principally focussed, and which constituted the great departure from the exercises of the past seventeen years—a departure which could not have been taken without the Act of 1897. It was this great concentration which cost the money, and was expected to bring in an adequate return for this money in the training and experience gained by the staff and by the troops. Connected with this assembly of troops were various experiments in transport and supply, which, from the magnitude of the task undertaken, filled the public mind to a large extent. And incidental to this assembly were the all-important arrangements for concentration by water and rail, for the technical services of telegraphs and water supply; and, lastly, the compliment paid to the Militia in including them in the arduous work assigned to the Regular troops.

¹ Report on the Manœuvres held in the neighbourhood of Salisbury in August and September, 1898, with appendices. Presented to Parliament by command of Her Majesty.

² In the manœuvres of 1898, 50,301 were under arms; in those of 1871, the number was 32,769. There were also manœuvres on a large scale in 1896.

It will be convenient to divide this article into four headings:—

1. The training of all combatant ranks.
2. The experiments.
3. Transport, supply, railway, and engineer services.
4. The working of the Manœuvres Act.

It will be interesting to note the opinions of the two commanders and compare them with that of the Commander-in-Chief, and check them to some extent with opinions current among the regimental officers serving and spectator officers watching the manœuvres.

1.—TRAINING.

The large majority of officers employed undoubtedly looked forward to the manœuvres with a keen expectation that their military knowledge would be largely increased, as very few had taken part in manœuvres on a large scale.

Some disappointment was, therefore, inevitable, as in large forces the excitement of frequent engagements is necessarily wanting, and the weariness of long marches in long columns is ever present. Whether by a different arrangement of schemes and camping grounds, such an excitement could have been provided and such weariness could have been avoided, it is not for this article to determine; but it was evident to any onlooker that the interest of the troops in their day's work was seriously impaired by these conditions, and that this interest tended to decrease as the manœuvres progressed.

The Duke of Connaught, commanding the Northern, or Red Army, remarks:—"Perhaps there was some particular object in testing to the utmost the capabilities of the forces assembled for manœuvre. Otherwise it would appear that the same work could have been carried out without taxing so highly their physical powers."

Sir Redvers Buller, in command of the Blue Army, says on the same subject:—"I think that the officer charged with the preparation of the schemes should also be charged with the selection of camps. By this means alone can excessive marches be prevented. On several occasions one of my divisions marched as much as 20 miles or more, and my intentions in a military sense were hampered by the knowledge that every mile I advanced the men had an extra mile home."

Lord Wolseley sums up this part of the subject with the following remarks:—"It would be optimistic to say that the fullest tactical value was obtained from each day's operations. Long days and nights out of bed affect the recruiting of a voluntary Army, and we cannot afford to ignore this fact. To work our men during manœuvres as is often done abroad would necessitate a far greater pressure upon our young soldiers than those responsible for the recruiting of our volunteer Army can venture to impose, during peace, upon the rank and file. . . . The distances to be covered to and from the points of collision were often great, and time was spent in marching, which would have been better used in tactical operations. But owing to the scarcity of water, those distances were not greater than they would have been in real war in the same

locality. The two armies might have been placed nearer to each other at the beginning of the manœuvres, but, had this been done, the cavalry would have lost all the opportunities afforded them of reconnoitring large bodies of troops on the move."

It is difficult to believe that, for the purposes of instruction, camping grounds could not have been arranged to meet the Commander-in-Chief's views that some of the time spent in marching would have been better used in tactical operations. Had ours been a conscript Army, the troops could hardly have worked harder, and the cavalry operations on the first day scarcely justified the loss of training to the other troops.

The schemes for these manœuvres were admittedly framed to suit the exigencies of the water supply. The general scheme from day to day is shown roughly in the following diagrams: its feature was the persistent employment of imaginary forces. This article of a director's equipment is at times of enormous value—even a necessity—but it should be used sparingly; it bears always the element of unreality and the consequent distrust of the troops. It may fairly be said that imaginary forces may legitimately be used, when the combatant forces are very small, and their *raison d'être* demands, that they form part of a larger (imaginary) army. Or, in certain circumstances, when the misreading of the director's intentions by a commander appears likely to render the day futile, the imaginary force suddenly announced at some tactical point may convert a barren day into good sound work.

But where two forces, each rather larger than an army corps, operate against one another, the introduction of imaginary forces on the first day seems unnecessary, and the subsequent enrolment of similar supernatural hosts in this case tended to confuse the simple mind of the downright British soldier. It must be feared that, speaking generally, neither men nor officers cared much about the General or Special Idea, even when they knew it, and the listlessness produced thereby added to their fatigue.

Again, several of the schemes failed to produce engagements, and this robbed the staffs and troops of much instruction. As the Duke of Connaught says:—"Subordinate commanders and the troops would have derived greater instruction had the schemes been worked so as to bring about more general and vigorous action, *e.g.*, the Special Ideas for three days of the operations were not calculated to bring about more than a collision with small portions of the opposing force, while the main bodies had a merely passive rôle."

On the other hand, Sir Redvers Buller sums up his report with the following words:—"There has been a disposition on the part of some critics of these manœuvres to dub every scheme a failure that did not produce a general engagement and two or more cavalry charges.

"The most valuable days to myself, and also to my staff, were, I am sure, those on which there were no collisions on a large scale. The lessons of manœuvres are not those given by stage battles."

In view of the cost of the operations, it is pardonable to ask which is of the greater importance—the instruction of the General and his staff, or the instruction of the 24,000 men and officers under his command?

The Commander-in-Chief naturally makes no remarks on this subject. The schemes, as printed in the Report, would be more intelligible and instructive were the orders issued by the chief commander on either side reproduced.

Another point which hampered the intelligence with which the troops followed the operations was the lateness of the hour at which their orders reached the different regiments.

The commander of the Red Army Corps writes:—"The duties of the staff would have been more expeditiously performed had it been possible to issue Army Orders at an earlier hour. The scheme for the following day was not issued until after the conference, when the afternoon was well advanced. The staff officer entrusted with it had then to ride a long distance to camp, and get the scheme printed while the orders for troops and baggage columns were being drafted. The orders were therefore seldom ready before 6.30 p.m., at which hour divisional staff officers attended to receive them. Some had considerable distances to traverse between their camp and that of the army headquarters, consequently the issue of divisional orders was not usually made until about 8.30 p.m., and those of brigades and smaller units not until after 10 p.m."

On the same subject the Blue commander reports:—"The issue of orders is always a difficulty. I adopted the only plan that can, I think, be used in war—a staff officer for each division and for the corps troops attended at headquarters daily about 6 p.m., and, when ready, the orders were dictated to them; they at the same time received replies to any questions they had to raise.

"In this manner all received identical information, and except on one evening, when the Special Idea miscarried, they all received their orders for the next day before 7 p.m., which is, I think, as early as is possible."

The dissemination of orders was one of the most important lessons to be learned by the various staffs; like all similar duties, it requires practice and precision. The "Cease fire" generally sounded before 1 p.m., and it is difficult to imagine why in some cases the next day's orders did not reach regiments for nearly 12 hours from that time. Too great elaboration in reproduction, or too little system in distribution, would seem to be responsible for a failure in an all-important point.

There seems to be no reason why the Special Ideas should not have been dictated on the ground when the "Cease fire" sounded by a member of the directing staff to a staff officer of each army, and much preliminary work could have been at once undertaken.

Elaborate preparations had been made to render the Umpire Service complete, and a system of Reporting Officers was initiated. Sir Redvers Buller is thoroughly dissatisfied with the result.

"Day after day one appealed to an umpire when the situation became uncertain, and received the answer, 'I am only a Reporting Officer; you must send for a senior umpire.'" Lord Wolseley, on the other hand, while admitting that the results were in a measure disappointing, considers that the novel feature of Reporting Officers fully justified its introduction.

There seems to be no reason why the Reporting Officers should be precluded from giving decisions when they alone can do so. It is of far

more importance that the tactical situation should be rapidly cleared up, than that an immaculate narrative should be compiled.

The whole tendency of recent narratives has been towards over-elaboration. A complete history, after the manner of a German official report, is not required. The history should give way to the criticism, and the latter loses its value if it is not promptly rendered. At these manœuvres the Remarks were seldom distributed until the events of the day were half forgotten. Sir Redvers Buller's eminently practical remarks augur well for the umpiring at Aldershot in the near future.

The Commander-in-Chief is justly dissatisfied with the maps: the 4-inch map was very bad, and the sheets of 1-inch were issued late. The use of two sheets of map on one day is, however, surely good training for the staff. As a rule, we are accustomed to have our maps in a shape more convenient than practical.

Few will disagree with Lord Wolseley's plea for a larger amount of blank ammunition at manœuvres.

As Sir Redvers Buller's army was welded into a fighting force at Wareham during the week preceding the manœuvres proper, so the cavalry division of three brigades had its own preliminary training, under General Luck, on the new War Office property at Bulford. Sir G. Luck's Report on this drill period is appended to the General Report.

When the manœuvres began, a brigade and a regiment were assigned to each army corps. The Commander-in-Chief had designed that these bodies of cavalry should have experience in reconnoitring large bodies of troops on the move, and this design is given as an excuse for the comparatively uninteresting nature of the infantry manœuvres.

It is to be doubted whether the cavalry attained this object; indeed, when the general direction of these large forces is well known to all beforehand, the interest in reconnaissance of all kinds is bound to be nominal. The first day was intended for special practice in this branch of work, and the other arms received no instruction; yet the result was disappointing indeed.

The Red brigade from Bower Chalke was ordered to reconnoitre southwards towards Blandford to report on the enemy's strength and movements, and endeavour to prevent him marching northwards. The Remarks further say that the task of this brigade was to cover the march of the army corps which was moving westward towards Shaftesbury.

The Blue brigade from Blandford was ordered towards Salisbury to clear up the situation in that direction, while the main body remained at Blandford.

"Contact was established before 12 noon, after which hour desultory and minor actions took place, between advanced parties only, for some hours.

"The commander of the Red cavalry kept his command concentrated and prepared to act, and he fulfilled the task assigned to him, so far as covering the march of the Red force was concerned. As regards information, the reports received by him from his advanced parties early in the

day were inconclusive and wanting in accuracy. It would, therefore, have been better had he secured more certain information by pushing forward with greater vigour.

"The Blue cavalry was directed by the Special Idea to clear up the situation towards Salisbury. The commander of the advanced Blue Army ordered it to obtain full information of any force between it and Salisbury.

"This information was not obtained, and the commander of the Blue Army was left in ignorance of the fact that the army was that day on the march from Salisbury towards Shaftesbury."

It would be interesting to read the orders issued to the cavalry brigades on this day.

The rival commanders do not think it necessary to make any special notes in their reports on the working of their cavalry brigades; but the Commander-in-Chief, besides a valuable series of recommendations on veterinary subjects, lays stress on the necessity for the cavalry leader being given a free hand, and remarks that scouting and reconnaissance should not be too much subordinated to concentration with a view to a fight. "The failure to report to Army commanders the movements and position of the hostile main body was observable on several occasions." He further touches on the difficult problem of the systematic transmission of information, and lays down some practical instructions on this point. "Speaking generally, he noticed the very great improvement which has taken place in the cavalry arm of recent years."

The artillery had a very successful week: the opportunity of seeing together the batteries of corps artillery with their admirable discipline and fire control was an object-lesson which military spectators thoroughly appreciated. The artillery generals had fine opportunities for the exercise of their commands in an admirable country, and if at times they showed a tendency to grab for their immediate command every gun within reach, it must be admitted that the temptation was a great one. The only blot on the work of this arm was not of its own making. "The very important duty of ammunition supply could not be practised. For economy's sake batteries were made to horse all their own transport, and this reduced the number of ammunition wagons to *one* per battery." The words are the Commander-in-Chief's; the italics are ours.

The fire discipline was, as usual, somewhat interfered with by the sound signals. These signals are so useful to the other arms, and tend so much to prevent unreality, that it would seem better to reform their details at a slightly greater cost in ammunition, than to abolish them altogether as the Duke of Connaught suggests. The screen system is altogether inadequate at long ranges, and although the Commander-in-Chief still considers that battalions were frequently exposed to artillery fire in unsuitable formations, the great improvement in the reality of our infantry movements at manœuvres is principally due to the sound signals of the artillery.

As usual, it was on the infantry that the heaviness of the campaign fell with its greatest weight. Long marches in long columns, heavy loads

under a burning sun, short nights and early reveilles, would have been borne far more easily had the day's work been more interesting.

On the whole, both Regulars and Militia acquitted themselves admirably on the march and in camp, and earned the commendation not only of their chiefs but of the critical crowd who followed the operations. "The feature of the manœuvres," in Sir Redver Buller's opinion, was the conduct and endurance of the rank and file; and his opinion is formed, it must be remembered, from his experience of the scratch units brought together from all parts of the country. Since the days comparatively recent of the marches to and from the New Forest manœuvres, the improvement in marching power is as remarkable as it is satisfactory. It must, of course, be remembered, that the line battalions as a rule left behind some 200 or 300 of their men—presumably the least fit. But still, considering the age of the men and the work they were called upon to do, the result must be considered encouraging.

The returns published on pages 9 and 15 of the Report of the men who fell out on each day, and the number of miles marched, etc., would have been more instructive had they included the stragglers who were to be seen in hundreds on the roads, and failed to march into camp. It must also be remembered, when comparing the marching powers of the Regulars and the Militia, that the former carried valises, but had been practised in marching, and had, in accordance with para. 2013, Queen's Regulations, 1898, two pairs of boots each, properly fitted. The Militia did not carry valises, but they had no preliminary training in marching, and had but one pair of boots each, indifferently fitted.

As far back as the Manœuvres of 1871, H.R.H. the Duke of Cambridge remarked that the Militia marched remarkably well, considering that they had but one pair of boots: a quarter of a century has been allowed to go by without this defect being remedied.

As might have been expected, the field service cap of the Regular infantry and the glengarry of the Militia were quite unsuited for operations in the summer; and the troops suffered proportionately. And the service gaiter is held responsible for many a blistered heel. The Duke of Connaught would save the men by carrying their valises for them; to shorten the marches would appear to be the sounder and more practical alternative. Like the cavalry, the infantry get little or no outpost practice, and the night operations, which have been a prominent feature in our recent manœuvres, were altogether omitted—both these points are to be regretted.

2.—THE EXPERIMENTS.

The contracts made with Messrs. Lipton, Ltd., and with Mr. Whiteley, constitute an experiment in the use of civilian organisation for military purposes, which afforded valuable experience—an experience which is summed up by the Commander-in-Chief in the following pregnant words:—"The general lesson learnt as regards civilian transport and supply is, that the almost boundless resources can never be relied upon for military purposes in war, unless a sound system of organisation has been carefully pre-arranged in peace. In other words, no amount of

riches, national or private, will enable you, on the breaking out of war, to improvise the military establishments absolutely necessary for feeding and moving an army in the field."

Messrs. Lipton were asked to contract for a mobile canteen with each brigade of each force—a canteen which was to include the supply of groceries, vegetables, etc. This was a gigantic undertaking, which, as the Duke of Connaught says, failed through absence of organisation and lack of experience. The wonder is that the failure was not greater, and a further wonder is that the military authorities should have entrusted such a gigantic venture to one firm, however pushing and up to date.

It is fair to say that Sir R. Buller, while advocating some alteration in the system of distribution, thinks on the whole that the course adopted was the best possible. But is there no alternative between entrusting this vast contract to one firm and dividing it among many? And was it essential that a dealer in tea should supply the Army's beer?

It is hard to believe that some better system could not have been devised. With the sites for camping grounds known beforehand, there is little reason to doubt that arrangements could have been made for the division of the contracts in the various camping *rayons*, with a stipulation that the imperishable stores should be assembled on the ground several days before the troops were to occupy them. This course would have prevented the blocking of many roads and provided for better organisation and arrangements for distribution.

Three courses only seem possible for this supply:—

1. The active service course, *i.e.*, to make no provision for any but the bare wants of the soldier: this would involve a stampede to the neighbouring public-houses.
2. To make the supply of drink (alcoholic and otherwise) an integral part of the military organisation.
3. To employ a contractor or contractors.

In weather like last September thirst was an element to be reckoned with, and the camping grounds being fixed, some form of contract was no doubt desirable; but over-centralisation failed as it always will. Civilian firms, however vast, cannot satisfactorily organise and control their subordinate staffs in so short a time.

In really mobile manœuvres the first or second course would be essential; in semi-mobile manœuvres such as these, some division of contracts would seem to be desirable.

The other great experiment—that of hired transport—was of far greater national importance. When we think of the small number of our Army Service Corps and the vast number of our Auxiliary troops, absolutely wanting in transport, a hired or impressed transport is an essential of a war in this country and the assembly and work of this large hired convoy was a most important venture.

Here, again, a sub-division of contracts would have been advisable, at least into two groups; the system adopted resulted in sub-letting and

insufficient control as well as inferiority in the quality of teams and vehicles. Besides, competition leads to rivalry, and rivalry makes for efficiency.

Nearly 1,000 vehicles with 2,400 horses and 1,300 civilian drivers were hired.

The point which struck onlookers most was the insufficiency of control in the columns; the Army Service Corps officers and N.C. officers worked indefatigably, but they could not be everywhere; and the latter had but little influence over the drivers, who were not subject to military law. A draft of mounted subalterns would have been invaluable.

The fact that the *personnel* of this hired transport was not under military discipline was a great difficulty. Some system for the employment of Militiamen and Volunteers, who would become for the time subject to military law, might be tried.

The horses and wagons were of fair quality, and luckily the roads were hard, otherwise the proportion of lead horses allowed would have been altogether insufficient. As it was, the baggage of one division arrived at the bottom of a hill a quarter of a mile from its camping-ground—late enough—at 9.30 p.m., but was not all in camp by 2 a.m. the following morning. Had the weather or the roads been wet, a general breakdown must have occurred, and the troops must have suffered severely.

If a purely civilian system of hire for transport is to be adopted in the future, it is a question whether it would not be better to give each unit a sum of money to let them provide their own regimental transport to be controlled by a brigade transport officer.

The Duke of Connaught's observations on pages 4 and 5 of the Report contain many useful suggestions.

Without expressing any sweeping approval or condemnation of these two experiments, it may be fairly said that the experience was a valuable one, and that lessons have been learned which should bear fruit at future manœuvres. Systems based on over-centralisation will fail in the future as in the past, and the mixture of Her Majesty's soldiers with drivers and issuers, absolutely indispensable to the troops but not subject to the same law, is bound to produce frequent anomalies, considerable friction, and occasional serious failures.

3.—ENGINEER SERVICES, TRANSPORT, SUPPLY, ETC.

In the preceding section the experimental ventures in transport and supply were discussed. It will be the object of this section to examine the working of our existing regular organisation in these subjects, as well as the kindred questions relating to the engineers (including water supply), railway transport, etc.

Speaking generally, it may be said that these services were admirably performed.

The Army Service Corps worked at high pressure throughout, and worked wonderfully well. Special contracts were made for bread, meat, and forage, fuel being bought locally; these contracts were fairly satisfactory.

But the whole system, as the Red commander points out, is unreal. The knotty point as to whether camp kettles should be sent on to the camping ground over night or after breakfast is really beside the question. The Duke of Connaught takes the practical and statesmanlike view of the subject when he says:—

"However convenient this system of sending parties ahead may be in peace manœuvres, it could not be carried out in war, and it appears to me desirable to assimilate, as far as possible, during manœuvres, the conditions to be expected in war. With this end in view, it is a question whether the method of cooking the men's rations which must obtain in the field should not be practised at manœuvres. If in the presence of an enemy we have to wait for the camp kettles to come up with the baggage columns, there appears to be a reasonable certainty that occasions will be frequent when the men will have to be without their dinners until a late hour, unless they are prepared and accustomed to cook in their mess tins. I am therefore of opinion that in future a trial should be made of cooking under real service conditions."

There can be little hardship in this system, when a Sunday, for which special arrangements could be made, occurs in the middle of the manœuvre period.

The transport work of the Army Service Corps can be summed up in Sir R. Buller's remark:—"Our A.S.C. transport was admirable, but it was under-staffed."

The Commander-in-Chief's opinion that a considerable increase in this branch of the Service is absolutely essential, will no doubt receive due consideration.

The Royal Engineers had much to be responsible for, but by far the most important of their duties was the water supply, which the chief commanders are unanimous in saying was admirably managed.

The telegraphs, which formed a perfect cobweb over the manœuvre area, bore testimony to the efficiency of this branch of the corps' work.

In the calm weather which prevailed the balloons were almost always aloft, and are reported to have done good service.

The bridging battalions had few opportunities, while the field companies gained no tactical experience owing to their technical vehicles being used as transport wagons for shelter-trench screens, pumps, and other camp equipment.

The very able report of the D.A.Q.M.G. on the railway arrangements forms the subject of an article in itself, but the following extracts will be of interest:—

Unit.	Average time of detrainment arriving at manœuvres.	Average time of entrainment from manœuvres.
Regular battalion of infantry ...	10	20
Militia " " ...	12	23
Battery R.H.A. ...	48	53
" R.A. ...	42	54
Squadron Cavalry ...	—	45

Number of Trains.

—	Before time.	Under 10 minutes late.	Under 30 minutes late.	Over 30 minutes late.
Arrivals	21	12	7	51
Departures	15	12	23	57

The despatch by rail of the hired transport added much to the labour of all concerned. "Trains ran approximately an hour late, owing to the late provision by companies, not to the entraining."

The assistance rendered to the civilian drivers in this operation by the Regular troops was invaluable.

The medical, veterinary, and ordnance services were efficient.

This section may be summed up with a general feeling of satisfaction at the increased efficiency of the engineer and departmental services.

4.—THE WORKING OF THE MANŒUVRES ACT.

The Report rendered by the Military Manœuvres Commission, composed principally of civilians, was naturally looked for with some anxiety by military readers. The result is eminently satisfactory. The commissioners entered on their task with a broadness of view which may well be commended to those Members of Parliament and others who narrowed the Manœuvres Act within its present limits.

No doubt the suggested amendments by the commissioners will receive due consideration :—

1. That the time for the lodging of the Order in Council with the local authorities should be reduced from six to three months. Last year no ground could be occupied under the Act before August 15th.
2. That the "authorised forces" should include all persons taking part officially in the manœuvres, such as civilian drivers, issuers, etc.
3. That roads may be closed for two hours without previous notice, provided that all reasonable facilities for traffic are given.
4. That the Commission may act by two of their number.
5. That each county should provide three instead of two commissioners.
6. That "rights and privileges" should be more clearly defined.

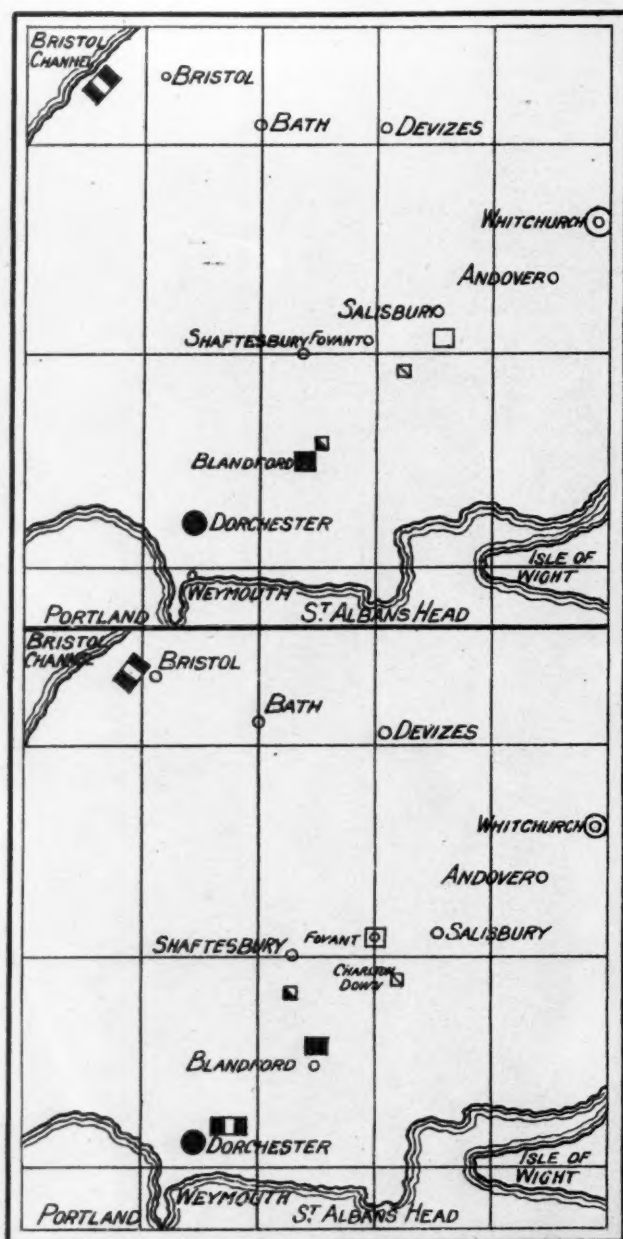
The damage done to crops and hedges was comparatively small, the cost of the repair of roads was very heavy.

The Report of the War Office Committee appointed to discuss the question of improvements which may be made in the conduct of future manœuvres has been issued since this article was framed. The Committee was composed of the commanders of the Red and Blue Armies, their chief staff officers, and a secretary; they frame their report on their experiences last autumn.

Without discussing the various points of detail, it may fairly be said that the recommendations made by the Committee would, if adopted, render future manœuvres a better picture of war and a more practical training for all ranks than those of last year. It was not to be expected that manœuvres on a large scale after the lapse of so many years would be immediately successful; the smaller manœuvres of past years have shown a progressive improvement, and there is no reason to doubt that our Grand Manœuvres, when next they take place, will yield better fruit than those of 1898.¹

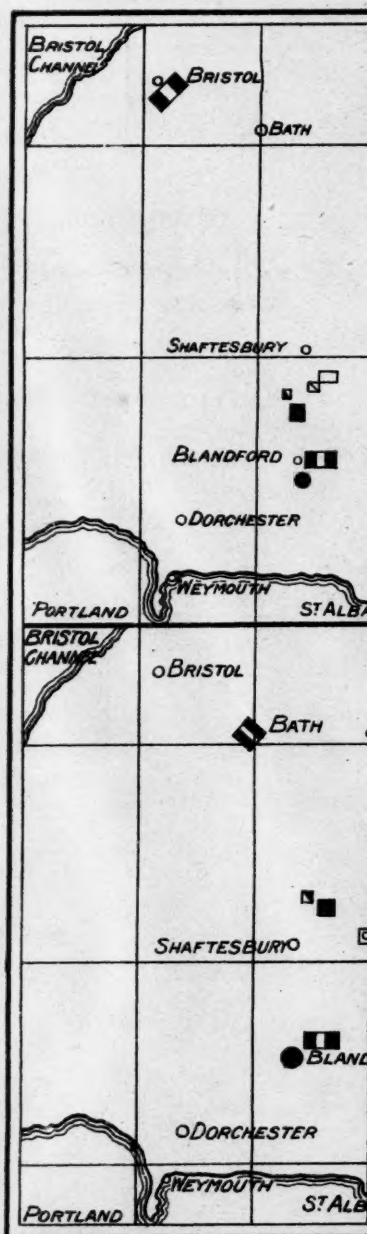
¹ The full text of the Report of the War Office Committee will be found on pp. 331-3 (Military Notes) of this month's JOURNAL.

POSITION AT TIME OF ISSUE OF ORDERS. 31ST AUG. '98



POSITION AT TIME OF ISSUE OF ORDERS 1ST SEPT. '98

POSITION AT TIME OF ISSUE



POSITION AT TIME OF ISSUE

REFERENCE

RED ARMY

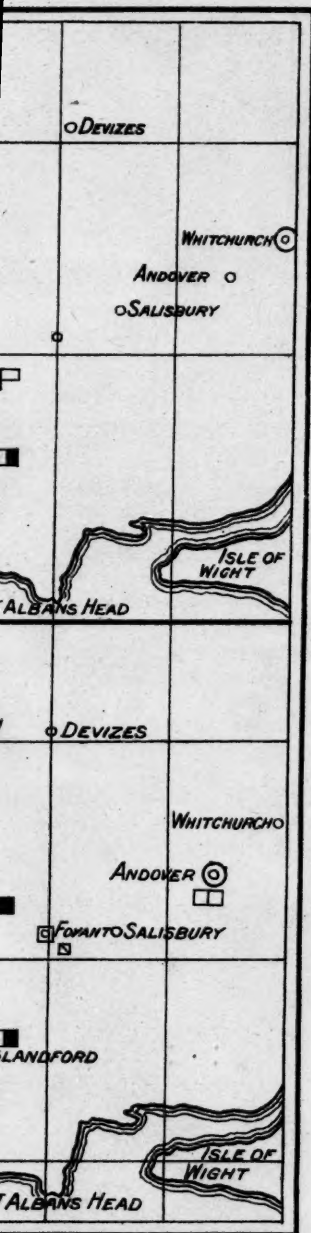
⊙ HEADQUARTERS

□ DUKE OF CONNAUGHT'S ARMY CORPS

□ IMAGINARY FORCES

0 1 SCALE
20 MILES

ISSUE OF ORDERS. 2nd SEPT '98



POSITION AT TIME OF ISSUE OF ORDERS. 5th SEPT '98



ISSUE OF ORDERS 4th SEPT '98



POSITION AT TIME OF ISSUE OF ORDERS. 6th SEPT '98

NAVAL NOTES.

HOME.—The following are the principal appointments which have been made : Captains—G. A. Giffard to "Comus" and as Commodore 2nd Class during fishery season, Newfoundland; W. C. C. Forsyth to "Pembroke"; W. H. B. Graham to "Royal Oak"; H. S. F. Niblett to "Diadem"; A. W. Chisholm-Batten to "Hawke"; J. Denison to "Melpomene"; A. M. Farquhar to "Wallaroo."

Rear-Admiral L. A. Beaumont has been selected to succeed Rear-Admiral H. St. L. Palliser in command of the Pacific station; he will fly his flag in the first-class armoured cruiser "Warspite," which will be commissioned at Chatham towards the end of the month by Captain T. P. Walker, who has been selected by Rear-Admiral Beaumont as his flag-captain. The third-class cruiser "Pylades" commissioned on the 8th ult. and left on the 28th ult. for Australia. The first-class armoured cruisers "Orlando" and "Aurora" commissioned on the 16th ult. at Portsmouth and Plymouth respectively, and have since left for China, where they will relieve the sister-ships "Undaunted" and "Narcissus." The first-class cruiser "Theseus" left on the 3rd ult. for the Mediterranean, where she relieved the "Gibraltar," a sister-ship, which arrived at Plymouth on the 15th ult.; she will pay off at Portsmouth. The first-class cruiser "Edgar" arrived at Plymouth on the 11th ult. from China, with relieved crews of the "Alacrity," "Daphne," "Redpole," and "Rattler"; she passed successfully through the terrific weather in the Bay and Atlantic, but lost one of her funnels; in spite of this mishap she arrived at Plymouth ahead of her time; she is undergoing repairs, and will, when ready, convey a new crew to Malta for the first-class battle-ship "Royal Oak," which is to be recommissioned at that port.

Steam Trials.—The new third-class cruiser "Psyche" has been carrying out her trials. During the 30 hours' trial the vessel attained a speed of nearly 17 knots, with her engines working at only half their full power. The mean results of the 30 hours' run were:—Steam, 216 lbs.; vacuum—26·6 inches starboard, port, 25·3; revolutions—171·5 starboard, 170 port; I.H.P., 1,815 starboard, 1,804 port—total, 3,619 speed; 16·8 knots, with a coal consumption of 2·3 lbs. per I.H.P. per hour. The result of the 8 hours' steam trial was highly satisfactory. The machinery worked as smoothly as on the 30 hours' trial at a reduced power. The full mean results of her 8 hours' natural-draught trial were:—Steam, 234 lbs.; vacuum—26·9 inches starboard, 25·9 port; revolutions—194·4 starboard, 193·6 port; I.H.P., 2,576 starboard, 2,519 port—total, 5,095; air pressure, 1 inch; speed, 19·3 knots. The Admiralty recently expressed a wish that the "Psyche" should be completed for sea by the end of March, but they have been informed that it is impossible to get her completed until the middle of April, although overtime will be worked. The new third-class cruiser "Pomone" has also completed her 30 hours' coal-consumption trial. The engines and boilers worked successfully throughout. The trial was at 3,500-H.P., and the mean for the 30 hours' run was 3,604, with a speed of 16·5 knots and a coal consumption of 2·45 lbs. per H.P. per hour. These results were obtained with a steam pressure of 242 lbs., the engines working 175 revolutions per minute. Her 4 hours' forced-draught trial was also successful, the results being as follows:—Pressure of steam in boilers, 251·9 lbs.; air pressure, 2·83

inches; vacuum—23·4 inches starboard, 23·5 inches port; revolutions—219·6 starboard, 221·7 port; I.H.P., 3,747·7 starboard, 3,592·4 port—total, 7,340·1; speed, 20·8 knots. Her engines were required to indicate 7,000-H.P.

The new first-class cruiser "Ariadne" has successfully completed her trials, the results being as follows:—30 hours' coal-consumption trial at one-fifth power: Speed, 13·3 knots; 3,753-I.H.P.; coal consumption, 2·05 per I.H.P. per hour; steam pressure in boilers, 218 lbs. per square inch. Second 30 hours' coal-consumption trial at four-fifths power. Speed, 20·1 knots; steam pressure, 262 lbs.; I.H.P., 14,046; coal consumption, 17·3 lbs. per I.H.P. per hour. 8 hours' full-power trial:—Speed of 21·5 knots; steam pressure, 288 lbs.; vacuum in condensers—25·1 starboard, and 25·5 port; revolutions per minute—118·8 starboard, 119 port; mean I.H.P., 9,583 starboard, 9,571 port—total, 19,156. The consumption of coal was 1·66 lbs. The speed of 21½ knots is three-quarters of a knot in excess of the Admiralty requirements.

Description of the Breech Mechanism for the 9·2-inch, 10-inch, and 12-inch Breech-loading Gun (Vickers, Sons & Maxim, Ltd.).—We have been kindly supplied by Messrs. Vickers with the photograph and accompanying description of their new breech mechanism for 9·2-inch, 10-inch, and 12-inch B.L. guns, which may be fitted with the necessary gear to enable it to be worked by hydraulic or other power, and is suitable for either right or left hand guns.

The mechanism is so arranged that, by turning the handwheel, the breech plug is first rotated and unlocked, and then swung out of the breech of the gun.

The unlocking of the breech plug is effected by means of what is commonly known as a toggle joint, the longer arm or link of which has one end fitted on a pin on the face of the breech plug, and the other end is fitted by a pivot joint to the shorter arm or crank mounted in a recess in the carrier on a pivot parallel with the axis of the gun, both the link and the crank thus working in a plane parallel to the face of the breech.

Round the boss of the crank are formed "skew gear" teeth, engaging into similar teeth formed partly round the boss of an intermediate quadrant pinion, which is also mounted in the carrier, but on a vertical pivot. This intermediate quadrant pinion has also formed partly round the boss ordinary spur teeth, which engage with similar teeth on an actuating quadrant pinion fixed on the hinge bolt of the carrier. The hinge bolt together with the actuating pinion are revolved by means of a worm and a wormwheel, which are in turn actuated by a handwheel suitably mounted at the breech of the gun.

To open the breech the handwheel is rotated, and thus by means of the worm-wheel the actuating pinion causes the intermediate quadrant and crank to turn, thus rotating the breech plug until it becomes unlocked. By continual turning of the handwheel, the carrier with the breech plug are swung out clear of the breech of the gun. The ordinary retaining catch is employed for holding the plug in position when out of the gun. The opposite action takes place on closing the breech.

The gun is arranged for firing by electric or percussion tubes, and its action is similar to that of the 6-inch Q.F. gun. A cam in the crank acting upon the firing gear slide during the first turning of the handwheel, when unlocking the breech, makes the gun absolutely safe before the breech plug commences to unscrew, and by the continued movement of the crank-cam the empty tube or primer is automatically ejected.

The breech plug is of special construction and is threaded in segmental portions in steps of varying radii.

By this arrangement the plug, which is divided into twelve segments, has three-fourths of its circumference threaded and useful for meeting the strains on the breech, while the ordinary breech plug has only half of its circumference threaded and similarly useful. This enables the breech plug to be very short.

Owing to the shortness of the breech plug, it can be swung clear of the breech after unlocking without any curvature, and without the usual longitudinal withdrawal of the plug, even though the De Bange obturator is used.

The Navy Estimates.—The following is the statement of the First Lord of the Admiralty, explanatory of the Navy Estimates, 1899-1900, presented to Parliament :—

The Navy Estimates for 1899-1900 amount to a net total of £26,594,500, as compared with the sum of £23,778,400 voted for the year 1898-99, showing an increase of £2,816,100.

Of this increase the votes connected with the *personnel* account for £452,600, including an increase of £53,300 in the non-effective votes, which will now amount to £1,890,700.

Various miscellaneous votes show an increase of £40,900.

The works vote is higher by £145,000.

The ordnance vote by £161,600.

The shipbuilding vote shows an increase of £2,016,000. The liabilities included in this vote due to the Supplemental Programme of last August amount to £2,000,000.

NUMBERS.

The total number of officers, seamen, and boys, Coastguard, and Royal Marines voted for the year 1898-99 was 106,390, being an increase on the previous year of 6,340.

On 1st February the number borne was 105,280, leaving only 1,110 to be entered during the months of February and March. There is no reason to doubt that the total number voted will be reached by the end of the financial year.

A force of 110,640 is proposed for 1899-1900, being an increase of 4,250.

The additions proposed are to meet the larger requirements of the Fleet, and are composed of :—

468 officers.
1,700 petty officers and seamen.
215 engine-room artificers and artisans.
1,000 stokers.
172 miscellaneous.
500 marines.
200 boys under training.
<hr/> 4,255

The increases in the numbers voted during the last few years entail a corresponding increase in the number of men in the gunnery and torpedo schools. Additional accommodation has, therefore, become necessary at Whale Island, for which provision has been made in the Estimates.

In order to make better provision for the accommodation and training of the second-class stokers waiting draft in the dépôt at Chatham, the "Northumberland" has been commissioned experimentally as tender to the "Pembroke."

The following increases in the several lists of officers have been rendered necessary by the continued expansion of the Fleet :—Flag officers, from 68 to 80 ; captains, from 208 to 245 ; commanders, from 304 to 360 ; lieutenants, from 1,150 to 1,550.

These additions will be effected gradually over a certain number of years.

The number of engineer officers is to be raised from 950 to 1,050 ; the increase to be spread over two years. Medical officers are to be raised from 450 to 490, gradually ; chaplains from 59 to 69 ; chaplains and naval instructors from 50 to 60 ; naval instructors 35 to 41 ; chief gunners to be increased from 80 to 100 ; chief boatswains to be increased from 80 to 100 ; gunners from 920 to 1,150 ; boatswains from 920 to 1,150 ; chief carpenters from 18 to 20 ; carpenters from 207 to 240.

Steps are being taken to effect a great simplification in the rules governing sea and harbour time of officers, which have long been felt to be in an unsatisfactory and anomalous condition.

The system of granting leave on full pay to certain classes of officers on return from service has been extended so as to include all commissioned officers below the rank of flag officer, and also warrant officers.

A new system has been inaugurated under which the Admiralty may at their discretion grant sick leave on full pay for a maximum period of three months to officers who become unfit for service at home or abroad from causes beyond their own control.

It has been necessary to meet the immediate requirements of the Fleet by entering 50 more officers from the mercantile marine, in order to tide over the interval which must elapse before a sufficient supply of executive officers trained up in the Service has been produced in the ordinary course. Such officers will, as before, be put on a separate list, and the provisions of the Order in Council governing the previous entries will be applicable to them.

The examination for the entry of engineer students and the regulations governing the course of training at Keyham College and in the dockyard have been revised.

Owing to the scarcity of shipwright ratings a scheme will be brought into force in April next for training shipwrights for the Navy in Her Majesty's dockyards. On completion of their training they will be drafted to sea-going ships, and after serving in the Service afloat for a certain number of years they will be eligible to be taken on the establishment of the dockyards. About 150 naval shipwright apprentices will be entered by open competition during the coming year.

Arrangements have been made with the Queenstown Sea Baths and Recreation Company by which a swimming bath will be available under certain conditions for the boys on board the training-ship "Black Prince" for learning to swim. Similar arrangements have been made at Queensferry for the "Caledonia," and a swimming bath is being built at Portland for the training-ships there.

The Royal Marines.

2,871 recruits were raised for the Corps during 1898. Of these, 572 were drafted to the Artillery branch, the remainder were trained for the Infantry.

The average height of the Artillery branch was maintained at 5 feet 7½ inches for youths under 20, increasing by an additional inch for men about 20. Growing lads for the Infantry branch were accepted at 5 feet 5½ inches, a higher standard being exacted for men who had passed the age of 20. Physically the recruits were of the average type usually accepted for the Corps of Royal Marines.

The waste of the Corps for the year amounted to a total of 2,138, including nearly 200 men who were transferred to serve as stokers, ship's police, artificers, and in other ratings, at their own request.

It has been decided to increase the net pay of the Marine on shore by 2d. a day. The deduction of 7d. now made for rations and groceries from his pay of 1s. 2d. will be reduced to 4d., while, on the other hand, the 1d. a day for beer money will be abolished. His net pay on shore will accordingly in future be 10d. in place of 8d.

The barrack-room accommodation at Walmer is still insufficient for the quartering of the whole of the recruits at the dépôt, and the temporary removal of the Royal Marine Artillery recruits to Eastney therefore remains in force. The recent addition of three blocks for 500 men has afforded scarcely adequate relief. The building of a new hospital is now in course of progress, and it is hoped will be finished this year. The old hospital will then become available as a barrack.

In consequence of the increase in the Royal Marine Artillery, and of the removal of the artillery recruits from Walmer, more barrack-room accommodation

became necessary at Eastney, and this was found by temporarily appropriating a portion of the married dormitories and quarters until more suitable rooms could be found. Provision is made in next year's Estimates for converting certain married quarters into barrack rooms for single men.

The rifle ranges at all divisions, except Plymouth, now afford sufficient safety for carrying out individual target practice with the Lee-Metford arm. At Plymouth there is still no range available, but possibly the Lydford Army Range, now in course of preparation by the War Office, will be able to provide for naval wants before the year is out. Meanwhile the musketry practice of the men of the Plymouth Division is being carried out at Gosport.

The average number of non-commissioned officers and men on shore during 1898 was 7,079. Of this number over 6,000 were put through the annual course of musketry training.

Many improvements have been carried out in the batteries, both in the supply of modern guns and in the facilities afforded for carrying out the instruction in ammunition. Certain old pattern breech-loading guns, which are still in the several batteries, will be gradually replaced by Q.F. guns as they become available for this service.

Two battalions of the Corps took part in the Army Manœuvres on Salisbury Plain in August and September, 1898.

Royal Naval Reserve.

The total number of executive officers now on the active list, who have served for 12 months or more in the Navy, or who are now undergoing 12 months' training, is 243, an increase of 18 since last year, notwithstanding that 35 of these officers have been appointed to be supplementary lieutenants and sub-lieutenants in the Royal Navy.

In the Estimates for 1898-99 provision was made for increasing the executive officers' list by 100. The additional officers have all been appointed, and there are now no vacancies, while 175 candidates are on the list of applicants for appointments.

By Order in Council of May 19th, 1898, an increase of 100 in the engineer officers' list was sanctioned, raising it to 400 officers in all. 351 officers are now borne, and it is anticipated that the list will be complete in a year at the present rate of volunteering.

The experimental instructional classes for engineers in the home dockyard reserves having proved successful, regular classes have now been instituted, to commence in February, June, and October each year. For the February course this year 18 officers applied and 6 (the number authorised) were appointed.

During the year ending December 31st, 1898, the enrolments in the Royal Naval Reserve were 2,757, including 621 firemen and 100 boys.

The numbers borne on December 31st, 1898, as compared with the numbers voted for the financial year 1898-99, were :—

	Voted.	Borne.
Qualified Seamen and 1st Class (old system)	11,000	10,836
Seamen Class and 2nd Class (old system)	11,000	11,696
Boys	300	303
Firemen	3,500	3,306
Totals	25,800	26,141

An increase of 1,000 seamen is proposed for 1899-1900.

During the year ending December 31st, 1898, 1,711 seamen were embarked for six months' training in Her Majesty's ships. On that day 810 of these men

were so serving. It is expected that 1,800 men will have been embarked during the financial year ending March 31st, 1899, an excess of 600 men over the number estimated. Provision has been made in the Estimates for 1898-1900 for the embarkation of 2,000 men.

The result of the entries in the new seamen class has been very satisfactory, the men being largely drawn from the fishing population throughout the United Kingdom. The coastguard ships have been kept up throughout the year to their full complement of Royal Naval Reserve men, while the remaining men, to the number of 588, have been sent to the Channel, Mediterranean, and North American stations.

The men as a rule have been well reported on. They are very amenable to discipline and take much interest in their instruction. On completion of their period of training and passing the examination 771 seamen were promoted to the qualified seamen class.

To enable the men to keep a smarter appearance an increased allowance of clothes has been granted.

The entry of boys into the Reserve has been stopped. They are not available for service in the Fleet in the event of emergency, and only about 60 per cent. of them remain in the Reserve on promotion to seamen at the age of 19.

The drill ships' armaments having been completed in accordance with the plan arranged a few years ago, further improvements are now being effected, and a scheme for supplying each drill ship and battery with a 6-inch Q.F. gun is being carried out.

The difficulty of getting dock accommodation for a modern cruiser in London and in other mercantile ports is so great that as a tentative measure a modern torpedo-gunboat has been placed in the Thames at Gravesend, which takes firing classes to sea whenever a class is ready, and it has proved so far very satisfactory. Officers now have the opportunity of firing from a gun-boat under way whenever they go through their drill in the "President." It is proposed to put another gun-boat at Portishead for the purpose of training the officers and men at Bristol.

MOBILISATION.

No manœuvres were held during 1898, but the Coast-guard and port-guard ships were completed for sea in the summer and autumn, and despatched on independent cruises.

During November the Coast-guard and port-guard ships were again mobilised.

Several important additions to the Fleet in commission have been made. The first-class battle-ships "Victorious" and "Barfleur" were transferred to the China station; two other first-class battle-ships, "Hannibal" and "Illustrious," being commissioned to take their places in the Channel and Mediterranean Squadrons respectively. The first-class cruiser "Terrible" was commissioned for special service. "Devastation" (second-class battle-ship) was added to the Mediterranean for service at Gibraltar; and the special service vessels of light draught, "Woodcock," "Woodlark," "Sandpiper," and "Snipe," were sent to the China station for river service.

In order to avoid delay in case of mobilisation, arrangements have been made to keep up a stock of clothing ready for immediate issue for 10,000 Royal Naval Reserve men and pensioners.

NEW CONSTRUCTION.

All the vessels proposed to be commenced during the financial year under the original programme, 1898-99, have been begun.

Of the vessels included under the Supplemental Programme the four battle-ships and two of the cruisers have been ordered, and tenders for the remaining two cruisers have been invited. Tenders for the 12 destroyers have been received,

and are now being considered. It was not possible to complete these arrangements at an earlier date, having regard to the preparation of the necessary designs and specifications, and to the large amount of current work on new construction.

Expenditure and progress on ships building have been greatly influenced by the unprecedented activity in mercantile shipbuilding, which has followed the settlement of the labour difficulties that so seriously affected the work of last year. The disarrangement of work arising from those difficulties has produced a sensible effect on the completion of ships in 1898-99, the most serious result being the great delay experienced in the supply of steel and other materials required by private firms to whom Admiralty orders have been given. This has been especially felt in the case of ships commenced in private yards in 1898-99. The dates of laying down the ships were consequently later, and the sums earned on these vessels have fallen below what would have been earned under ordinary conditions.

The manufacture of armour has been affected by the fact that the introduction of a new and superior quality has necessitated the reconstruction of plant, and involved many difficulties only to be overcome by experience. The output has been greater during the current year as compared with 1897-98, but the anticipation of the Admiralty that there would still be a temporary limitation of the supply has proved to be correct. All the manufacturing firms have been kept full of orders, and urged to increased production, but the earnings for the present financial year will fall considerably below the sum provided in the Estimates.

It is hoped that in the coming financial year 1899-1900 a larger output of armour will be available.

On contract work generally (including armour, hulls, machinery, gun-mountings, etc.) the various hindrances above mentioned will cause the aggregate earnings to fall short by about £800,000 of the estimated amount. On ships previously ordered, which were in stages of construction less affected by the peculiar conditions of the year, excellent progress has been made, and in some cases the amounts earned have exceeded expectations. Moreover, in some instances, where the commencement of work was delayed considerably, very rapid progress has been made since, and it may still be hoped that the contract dates for completion will be kept.

New ships building in the dockyards have not been so sensibly affected by the same difficulties, so far as the hulls are concerned, but they have necessarily suffered by the delay in the delivery of machinery and armour, etc., from contractors. All that has been possible has been done to minimise the inconvenience by advancing the dockyard work in other directions. Extra expenditure on labour and ordinary materials for new construction and on repairs in the dockyards will to the extent of about £360,000 absorb the short earnings on armour and other contract work.

Battle-ships.

The battle-ships "Hannibal" and "Illustrious" ("Majestic" class), which were practically ready for service at the end of the last financial year, were commissioned soon afterwards.

Of the "Canopus" class, two (the "Canopus" and "Ocean") will be completed and ready for trials about June next, the "Goliath" will follow about three months later, and the "Albion" and "Glory" will, it is anticipated, be delivered by the contractors in time for completion before the close of the financial year 1899-1900. The last vessel of the class, "Vengeance," is being rapidly advanced, and, according to the contract, will be delivered in July, 1900.

Of the "Formidable" class, two (the "Formidable" and "Irresistible") were launched before the end of 1898, and the "Implacable" is to be launched this month. In this case the rate of advancement has exceeded expectation. My statement of last year indicated the possibility that the three slips thus rendered vacant might not be available for laying down later vessels of the class before the beginning of 1899-1900. As a matter of fact, the building of the "London" was

commenced early in December 1898, the "Venerable" on January 2nd, 1899, and the "Bulwark" will be laid down immediately after the launch of the "Implacable."

These six vessels form a group identical in speed, armament, and dimensions, the three latest vessels having slightly modified arrangements of the protection at the bow. The class has already been described to Parliament. The ships are really improved "Majestics," with new and more powerful types of guns and armour of the latest quality, associated with higher speed and water-tube boilers.

The four battle-ships recently ordered under the Supplemental Programme are intermediate in size between the "Formidable" and "Canopus" classes, and have practically the same armament as the "Formidable," but are to have superior speed and thinner armour. They are to be known as the "Duncan" class.

The following are their principal features:—Length between perpendiculars, 405 feet; breadth, extreme, 75 feet 6 inches; mean draught, 26 feet 6 inches; displacement, 14,000 tons; speed (with natural draught), 19 knots; I.H.P., 18,000. Armament:—Four 12-inch breech-loading guns in two barbettes, twelve 6-inch Q.F. in casemates, twelve 12-pounder Q.F., six 3-pounders, and four torpedo-tubes.

Stability and buoyancy will be secured by vertical side armour 7 inches thick extending over a considerable portion of the length, and continued in a gradually reduced thickness to the bow.

The barbettes for the 12-inch guns will have 11-inch armour, and the casemates for the 6-inch guns, 6-inch armour.

All armour will be of the latest and most improved quality, possessing much greater defensive power in proportion to its thickness than armour used in the "Majestic" class.

Belleville boilers, with economisers, will be fitted.

The speed of 19 knots exceeds that of preceding battle-ships in the Royal Navy, and is to be obtained on an eight hours' trial with natural draught in the stokeholds. For continuous steaming at sea in smooth water and with clean bottoms it is estimated that about 18 knots should be maintained.

The coal carried will be 900 tons at normal draught, and the bunker capacity will be 2,000 tons. In these respects the new ships are practically identical with the "Majestic" and "Formidable" classes.

First-class Cruisers.

Of the eight vessels belonging to the "Diadem" class which were in hand at the beginning of 1898-99, two (the "Diadem" and "Niobe") are in commission; the "Europa" has been for some time complete and in the Fleet Reserve; the "Andromeda" and "Argonaut" have completed their trials, and will be ready for service by the end of the present financial year.

The "Ariadne" has finished her steam trials and will be completed at an early date; the "Amphitrite" has been delivered by the contractors, and her trials will shortly take place. The "Spartiate" is being advanced at Pembroke. All these vessels will be ready for service in 1899-1900.

Six armoured cruisers, of the "Cressy" class are building by contract; two of these have been ordered in 1898-99, as part of the new programme of four armoured cruisers included in the Estimates of that year. The difficulties in the supply of materials greatly delayed their commencement, but good progress is now being made, and there is no reason to doubt that the contract dates for delivery will be kept.

Four large armoured cruisers have been ordered recently, of which two belong to the original programme for 1898-99, and two to the Supplemental Programme. A general description of the designs was given to Parliament when the latter programme was introduced in July, 1898. The type will be known as the "Drake" class. The following are their principal features:—Length between perpendiculars, 500 feet; breadth, extreme, 71 feet; mean draught, 26 feet;

displacement, 14,100 tons; speed (with natural draught), 23 knots; I.H.P., 30,000. Armament:—Two 9·2-inch guns with armoured shields, sixteen 6-inch Q.F. guns in casemates, fourteen 12-pounder Q.F. guns, three 3-pounders, two torpedo-tubes.

The 9·2-inch and 6-inch guns will be of the latest and most powerful types, with armour protection equal to that of the "Powerful" class. Buoyancy and stability will be secured by vertical side armour, about 6 inches thick, associated with strong steel decks, as in the "Canopus" and "Cressy" classes. The bows of the new vessels will be more strongly defended. The steel hulls will be unsheathed.

Belleveille boilers, with economisers, will be fitted. Twin screws will be adopted. The speed of 23 knots is to be maintained for eight hours on the contractors' trials, with natural draught in the stokeholds. For continuous steaming at sea in smooth water 21 knots should be maintained. The coal-bunker capacity will be 2,500 tons, and 1,250 tons are to be carried at the speed trials.

One of these vessels is building at Pembroke, and the remaining three by contract.

Two other cruisers were included in the Supplemental Programme. They will be of a new design, and tenders have been invited for their construction. Their principal features are as follows:—Length between perpendiculars, 440 feet; breadth, extreme, 66 feet; mean draught, 24½ feet; displacement, 9,800 tons; speed (with natural draught), 23 knots; I.H.P., 22,000. Armament:—Fourteen 6-inch Q.F. guns (four in turrets, ten in casemates), ten 12-pounder Q.F. guns, three 3-pounders, two torpedo-tubes.

The 6-inch guns will be of the latest type, and will be protected by armour about 4 inches thick. Vertical side armour of the same thickness will be carried over a considerable portion of the length, with thinner armour on the bows. Strong protective decks will be associated with this side armour. The steel hulls will be unsheathed.

Belleveille boilers, with economisers, will be fitted. The speed of 23 knots is to be maintained for eight hours on contractors' trials. For smooth water continuous steaming at sea about 21 knots should be maintained. The coal-bunker capacity will be for 1,600 tons, and 800 tons are to be carried on the speed trial.

Second-Class Cruisers.

Two of the three vessels of the "Arrogant" class in hand at the beginning of 1898-99, namely, the "Furious" and "Vindictive," have been completed, and one of them, the "Furious," has been in commission since July last. The third, the "Gladiator," will, it is anticipated, be completed this financial year.

Three vessels of the improved "Talbot" class ("Hermes") building by contract have been well advanced during 1898-99, and will be completed early in the next financial year. The "Hermes" will be delivered this month.

Third-Class Cruisers.

Of the ten third-class cruisers of the "Pelorus" type which were in hand on April 1st, 1898, the "Proserpine," "Pactolus," and "Pegasus" have been completed and are in commission. The "Psyche," "Pomone," "Perseus," and "Prometheus" will be completed very early in the next financial year. The remaining two vessels will be completed before the end of the year.

Sloops and Gun-boats.

Six sloops of the "Condor" class are in hand. Two of these are to be completed early in the next financial year; the others will be considerably advanced.

The four twin-screw gun-boats ("Dwarf" class), building by contract, are approaching completion.

Torpedo-Boat Destroyers.

The Supplementary Programme provided for 12 additional torpedo-boat destroyers. Orders for them will be placed before the end of the present financial year.

Of the 42 destroyers of 26 to 27 knots speed, two did not complete their trials successfully with locomotive boilers, and water-tube boilers are now being fitted. It is hoped that they will be ready for service during next summer.

Of the 50 vessels of 30 knots speed which have been ordered in previous years, 31 have been tried and delivered, and another has been tried and will soon be delivered. The remaining 18 are well advanced, and some have passed their preliminary trials.

Four experimental vessels of still higher speeds have been ordered. Two of these are under trial. One has been fitted with a steam-turbine, but the trials will not be made for some time. The fourth vessel has not yet been commenced.

New Royal Yacht.

This vessel has been considerably advanced at Pembroke. The launch will take place in May, and it is anticipated that she will be ready for her steam trials towards the end of the year. Her completion is probable in the early summer of 1900. The principal particulars are:—Length between perpendiculars, 380 feet; breadth extreme, 50 feet; mean draught, 18 feet; displacement, 4,700 tons; I.H.P., 11,000; speed, 20 knots.

NEW SHIPBUILDING PROGRAMME.

In the coming financial year it is proposed to commence in the dockyards:—Two battle-ships (design not decided), two armoured first-class cruisers, 9,800 tons, three smaller cruisers (design not decided), two sloops.

By contract it is proposed to build two first-class torpedo-boats to replace others struck off the list.

The two sloops to be laid down are to be in their general character similar to the "Phoenix" and "Algerine." They will be propelled by twin screws, and be of moderate draught suitable for river service.

Reconstruction and Repairs.

The following ships have been or will be completed in the yards during 1898-99:—"Dreadnought," "Forte," "Brisk," "Cossack," "Tartar," "Superb," "Edinburgh," "Pylades," "Buzzard," "Dolphin," "Comus," "Crescent," "Orlando," "St. George," "Sybille," "Bellona," "Marathon," "Seagull," "Collingwood," "Cambrian," "Blonde," "Calypso," "Salamander," "Sheldrake," "Æolus," "Charybdis," "Retribution," "Spartan," "Rainbow," "Philomel."

The following ships are in hand:—"Hecate," "Speedy," "Active," "Scout," "Pique," "Blanche," "Blake," "Astræa," "Cordelia," "Partridge."

The work in the Royal dockyards continues to be performed in a satisfactory and an economical manner. The naval yards abroad have been fully employed in carrying out the work of repairing ships for recommission, and also the ordinary necessary repairs, etc., to commissioned ships.

Particulars of the repairs and refits to be carried out in 1899-1900 are given in the appendix to the Estimates.

Machinery and Boilers.

Between the date of issue of last year's statement and April 1st, 1898, the battle-ship "Illustrious" and nine torpedo-boat destroyers passed through their trials.

The following vessels have completed their contract steam trials during the present financial year:—

First-class cruisers.—"Niobe," "Europa," "Andromeda," "Argonaut," and "Ariadne."

Second-class cruisers.—"Furious," "Vindictive," and "Gladiator."

Third-class cruisers.—"Pegasus," "Pactolus," "Proserpine," "Psyche," and "Pomone."

Eight torpedo-boat destroyers of 30 knots speed, and two of 27 knots.

The trials of the third-class cruiser "Perseus" will probably be completed before the end of the current financial year.

The torpedo-boat destroyer "Dasher" has been re-boilered and passed successfully through her trials. The third-class cruiser "Barham" and torpedo gun-boat "Seagull" have also been re-boilered, and it is expected will pass through their trials this financial year. The torpedo gun-boats "Salamander" and "Sheldrake" have been re-boilered, and passed their trials satisfactorily.

The "Salamander," fitted with Mumford type of boilers, is in commission on the Mediterranean station, and experience of this type on service is being watched.

The "Sheldrake," fitted with boilers of the Babcock and Wilcox type, which, in regard to diameter of tubes, is intermediate between the large and small diameter tube types, has been commissioned, and is being put through a series of sea-going trials similar to those carried out in the "Sharpshooter" in 1894-95.

The "Diadem" made, on commissioning, a run of 57 hours at a speed of 19·7 knots, and 14,933-I.H.P., or 90 per cent. of maximum power. Recently she made the run from Gibraltar to the Nore in 69 hours at a speed of 19·27 knots, and an average I.H.P. of 14,268, or 86·4 per cent. of her maximum power.

All ships fitted with Belleville boilers, except the first seven, are fitted with economisers similar to those in the "Diadem."

Naval Ordnance.

The manufacture of guns is proceeding satisfactorily, and the production is keeping pace with the requirements of the Fleet.

A design of a new and more powerful 12-inch B.L. wire gun has been approved. The first gun has been delivered and is now under trial. This type of gun will be mounted in the "Formidable" class of battle-ships.

A new design of 9·2-inch B.L. wire gun has also been approved. The first gun is under manufacture, and not yet completed. It is intended to mount this type of gun in the armoured cruisers of the "Cressy" class and of the "Drake" class.

The conversion of 6-inch B.L. guns to quick-firers for sea-going ships will be completed by the end of the present financial year. Provision has been made to convert similar guns to quick-firers for the Royal Naval Reserve batteries and drill-ships.

The supply of the magazine rifle to the whole of the Naval Services has now been completed.

The output of ammunition by the trade and the Ordnance Factories has been equal to the requirements of the Navy during the past year, and no difficulty would be experienced in obtaining still larger quantities if at any time such increase should be found to be necessary.

Considerable progress has been made in the issue of cordite cartridges to the Fleet for Q.F. guns, and the policy of supplying cordite ammunition for heavy B.L. guns is being continued.

As regards the production of cordite, there is no difficulty in obtaining all that may be required. At the present time, in addition to the Government factory at Waltham, three private firms are employed in the manufacture of cordite for the Navy. The area of supply could be still further widened if occasion required it.

Trials with improved types of projectiles, necessitated by the recent developments in armour, have been in progress, and satisfactory results have so far been obtained, though the trials are not yet completed.

As each year passes, the necessity of replacing torpedoes of the earlier types becomes more apparent. A considerable number of the later type have been supplied during the past year.

The manufacture of gun mountings of all types is proceeding satisfactorily, and the results obtained at prize-firing show that the rapidity of fire of heavy guns is most satisfactory. In the mountings now under construction it is hoped that these results will be still further improved.

NEW WORKS.

New Works in the Estimates.

The principal new works for which provision is made in the Estimates for 1899-1900 are:—

At Chatham, a new building slip and a new foundry. It has been found impossible to reconstruct the old foundry, owing to the failure of the foundations.

At Portsmouth, the extension of No. 5 building slip and the construction of a new smithery.

At Pembroke, a new smithery.

At Wei-hai-wei, it is proposed to begin the establishment of a naval dépôt. Dredging operations have been already commenced.

For hospitals a considerably increased expenditure is again required to provide accommodation for the increased numbers borne, and to improve the existing buildings.

Works in Progress.

The lengthening of No. 5 dock at Chatham, the new boiler-shop at Portsmouth, and the new mould-loft at Devonport have been completed.

At Malta, the work of improving the harbour by dredging, and the construction of deep-water wharf walls in French Creek are being continued. Valuable space has been gained for dockyard use by levelling the Valperga bastion.

Good progress has been made with the hospital extensions included in the vote for 1898-99.

Progress under the Naval Works Acts.

Enclosure and Defence of Harbours.

Gibraltar.—The Admiralty mole extension was brought up to water level throughout its whole length by September 30th last. The quay wall is making good progress.

The two Titan cranes on the detached mole are at work setting blocks to form the upper structure of the mole, of which about 200 feet have been completed.

On the commercial mole the reclamation and wharf wall are finished. A portion of the new wharf has been opened for traffic.

The whole of the works at Gibraltar have now been transferred to a contractor. The Admiralty mole extension already affords protection against torpedo attack for its whole length. The detached mole will have made sufficient progress to do the same by March, 1900, and the commercial mole by March, 1901. The remaining work, such as quays, heads, lighthouses, coaling sheds, etc., will be finally completed, in the case of the extension and detached moles, in December, 1902, and in the case of the commercial mole in June, 1903.

Portland.—Progress is very satisfactory. The contract date for completion up to low-water level in September of the current year, but this date will probably be anticipated.

Dover.—*Admiralty Pier Extension.*—Fair progress has been made with the western workyard. The blockmaking floor, concrete mixers, and cement shed are practically complete, and blockmaking has been commenced.

Some damage was caused to the revetment wall of this workyard during the recent gales, but this damage is now being repaired, and the work in the yard has not been hindered.

East Reclamation.—The extension of the Castle Jetty has been proceeded with, and a considerable length has been filled with chalk and decked over, and is now in use for unloading materials.

The cliff excavation has also been proceeded with.

The staging and trestle railway has been completed for a length of about 1,000 feet, and a start has been made with the reclamation wall, the foundations of which have been put in for a length of 500 feet. The concrete block facing, with the concrete-in-mass backing, is being proceeded with at every available tide.

Sandwich, etc.—The blockyard and other works at Sandwich are now in full swing. The bridge over the Stour has been built, and the railway connection with the main line has been made, thus enabling ballast to be taken direct by rail to the west workyard at Dover.

The railway connection has been made with Dungeness, and ballast is being delivered for use at the west workyard at Dover.

Adapting Naval Ports to Present Needs of Fleet.

Deepening harbours and approaches.

Chatham and Haulbowline.—The dredging is finished.

Portsmouth.—Work is proceeding, but it has been necessary to send four of the dredgers to other places, and progress is therefore slower.

Devonport.—The removal of the Vanguard Shoal and Rubble Bank will be finished before the close of the financial year. Work on the Cremyll Shoal is well advanced, and dredging above Saltash Bridge is in hand.

Keyham Dockyard Extension.—The cofferdam enclosing the site of the tidal basin and the cofferdam enclosing the docks and locks have been completed, and the water pumped out of the enclosed area.

The east wall of the closed basin is practically finished, and good progress has been made with the walls of the tidal basin and the west wall of the lock. Work on No. 4 Dock is proceeding, and the excavation of mud on the site of the other docks has been steadily continued.

Portsmouth.—The two new docks have been in use since June and December, 1896.

Gibraltar Dockyard Extension.—This work was handed over to contractors in December last. One dock with all necessary appliances for docking ships, together with a portion of the new shops, will be ready for use in December, 1901. The date for the final completion of the whole extension is December, 1904.

Hong-Kong.—Sharp's Buildings have been acquired, and the War Office has transferred the North Barracks to the Admiralty. The area of the dockyard and the water frontage have thus been nearly doubled. Work is at present being carried on by the Admiralty, but tenders will be invited from the contractors as soon as possible.

Colombo Dock.—This dock is to be constructed by the Colonial Government. Work has been begun.

Pembroke Jetty.—Satisfactory progress has been made.

Portsmouth—Widening Caisson.—Satisfactory progress has been made.

Haulbowline Improvements.—The bridge over the Camber, pitching slopes of basin, engine-house at slipway and police quarters, besides some minor works, have been completed, and the Camber has been dredged. The new fitting-shop is nearly completed, and the new jetty, for which a contract has been let, is partly finished. The slipway, roads, railways, etc., which are being carried out by departmental labour, are nearly completed.

NAVAL BARRACKS, ETC.

Chatham Naval Barracks.—The War Office handed over the site of the Brennan Torpedo Factory in October. Good progress has been made with the new blocks of buildings.

Sheerness Naval Barracks.—The proposal to build new barracks for the Gunnery School at Sheerness has been abandoned, as the only available site was found on examination to be unsuitable on sanitary grounds. Negotiations for a site at Chatham are in progress.

Portsmouth Naval Barracks.—A contract has just been made for this work. An agreement has been made with the War Office for the future transfer of the Garrison Hospital and its grounds to the Admiralty.

Keyham Naval Barracks.—The eastern block of seamen's quarters is up to first-floor level; the foundations of the western block are finished; and the officers' mess and quarters are up to damp-course level.

Chatham Naval Hospital.—Tenders are being invited.

Walmer Marine Depot and Keyham Engineers' College.—These works were finished last year.

Dartmouth College.—The land has been purchased and the preparation of the site and the laying out of the grounds are proceeding. Tenders for the erection of the college will be invited shortly.

Magazines.—Good progress is being made.

Haslar Zymotic Hospital.—Plans have been prepared and tenders will shortly be invited.

Haulbowline Zymotic Hospital.—A contract has been let.

A Bill to make provision for the continuation of these works and for the commencement of certain others will be submitted to Parliament.

March 7th, 1899.

GEORGE J. GOSCHEN.

The following is an abstract of the Navy Estimates for 1889-1900, and a comparison, showing increases and decreases, with the corresponding votes for last year :—

Votes.		Net Estimates.		Difference on Net Estimates.	
		1889-1900.	1898-99.	Increase.	Decrease.
	I.—Numbers.	Total Numbers.	Total Numbers.	Numbers.	Numbers.
A	Total Number of Officers, Seamen, Boys, Coast Guard, and Royal Marines	110,640	106,390	4,250	—
	II.—Effective Services.	£	£	£	£
1	Wages, etc., of Officers, Seamen, and Boys, Coast Guard, and Royal Marines	5,242,700	4,988,000	254,700	—
2	Victualling and Clothing for the Navy ...	1,606,700	1,491,700	115,000	—
3	Medical Establishments and Services ...	176,600	167,000	9,600	—
4	Martial Law ...	12,200	11,400	800	—
5	Educational Services ...	90,600	86,600	4,000	—
6	Scientific Services ...	69,500	67,200	2,300	—
7	Royal Naval Reserves ...	271,000	257,000	14,000	—
8	Shipbuilding, Repairs, Maintenance, etc. :—				
	Section I.— <i>Personnel</i> ...	2,417,000	2,218,000	199,000	—
	Section II.— <i>Matériel</i> ...	3,799,000	2,971,000	828,000	—
	Section III.—Contract Work ...	6,601,000	5,612,000	989,000	—
9	Naval Armaments ...	2,710,800	2,549,200	161,600	—
10	Works, Buildings, and Repairs at Home and Abroad	795,100	650,100	145,000	—
11	Miscellaneous Effective Services ...	248,200	232,900	15,300	—
12	Admiralty Office ...	261,600	247,700	13,900	—
	Total Effective Services...	24,302,000	21,549,800	2,752,200	—
	III.—Non-Effective Services.				
13	Half Pay, Reserved, and Retired Pay ...	774,700	752,500	22,200	—
14	Naval and Marine Pensions, Gratuities, and Compassionate Allowances ...	1,116,000	1,082,900	33,100	—
15	Civil Pensions and Gratuities ...	341,500	332,900	8,600	—
	Total Non-Effective Services ...	2,232,200	2,168,300	63,900	—
	IV.—Extra Estimate for Services in connection with the Colonies...				
16	Additional Naval Force for Service in Australasian Waters—Annuity payable under ...	60,300	60,300	—	—
	Grand Total ...	26,594,500	23,778,400	2,816,100	—
	Net Increase ...	...	...	£2,816,100	—

ARGENTINE REPUBLIC.—*The Ministry of Marine.*—The New Ministry of Marine, which has been created on account of the rapidly increasing importance of the Navy, has now been definitively constituted. There is a Chief of the Staff, with four Administrative Departments:—The *Personnel*; the Fleet in Commission, with the *Matériel* and Section relative to the movements of ships; Legal and Statistical Department; Guns, Torpedoes, Electricity, Hydrography, and the Maritime Prefecture.

The Evolutionary Squadron has been constituted into two divisions.

First Division:—

First-class armoured cruisers—"San Martín," "General Belgrano," "General Pueyrredon," "Garibaldi."

Second-class cruiser—"Buenos Aires."

Second Division:—

Armoured ships—"Almirante Brown," "Libertad," "Independencia."

Second-class cruisers—"9 de Julio," "25 de Mayo."

Torpedo-boat destroyer—"Patria."

New Cruisers.—The new first-class armoured cruiser, originally laid down as the "Varese" for the Italian Government, but which was sold last year to the Argentine Government, has now been delivered by her builders, the firm of Orlando Bros., at Leghorn, and been re-christened the "General Belgrano." She is almost identical with the "Cristobal Colon," which was sold to the Spanish Government, and sunk in the action off Santiago last year. Her dimensions are as follows:—Length, 328 feet; beam, 59 feet 8 inches; with a displacement of 6,882 tons on a draught of 24 feet. Protection is afforded by a nickel-steel water-line belt of a maximum thickness of 6 inches, tapering to 2·8 inches at the extremities, with a 1·5-inch armoured deck. Above the water-line belt is an armoured citadel, about 200 feet long, also protected by 6-inch armour, at each end of which rises a barbet, also protected by 6-inch armour, for the heavy guns; the armament consists of two 10-inch 40-calibre guns, mounted one forward and one aft in the barbets; ten 6-inch Q.F. guns in the casemate; six 4·7-inch Q.F. guns, and twenty small Q.F., with two machine guns. There are also four submerged broadside torpedo-tubes. The engines are to develop 13,000 I.H.P. under forced draught, giving a speed of 20 knots, and 8,600 I.H.P. with natural draught, giving a speed of 18 knots. The normal coal supply is 600 tons, but stowage can be found for 1,100 tons if necessary.

A sister-ship, the "San Martín," built by the same firm has lately successfully completed her steam trials off Spezzia. The first was an eight hours' run under natural draught. The engines developed 8,285·8 I.H.P., giving a mean speed of 18·07 knots, with a coal consumption of 0·8 kilogramme per H.P. per hour. Some progressive trials were then made at from 10 to 18 knots speed, the engines developing 1,124·47 to 8,285·8 I.H.P. with from 48 to 92 revolutions. At the two hours' forced-draught run, the engines developed 12,436 I.H.P., with a maximum speed of 20·06 knots and a mean of 19·6 knots, the revolutions being 104.—*Marine Rundschau und Mittheilungen aus dem Gebiete des Seewesens.*

DENMARK.—*The Naval Estimates for 1899.*—The Naval Estimates for 1899-1900 amount to 6,996,845 kronen (a krone = 1s. 1½d.) for the Ordinary and 930,000 kronen for the Extraordinary Budgets. For the construction of new ships a sum of 1,217,000 kronen is demanded, of which 1,117,000 kronen is to be used for the completion of the new battle-ship "Herluf Trolle," while the balance of 100,000 kronen will be devoted to laying down another ship of the same type. For maintenance of existing ships 791,000 kronen is required. The battle-ship "Tordenskiold" and the gun-boat "Grönsund" are both to undergo extensive repairs. For ships in commission during the next twelve months, a sum of 800,000 kronen is asked for. The training squadron will consist of the battle-ship "Iver Hvitfeldt," the cruiser-corvette "Valkyrien," the third-class cruiser "Geiser," the

submarine-mine training-ship "Hjælperin," and four first-class torpedo-boats. There are also to be commissioned the corvette "Dagmar" as training-ship for cadets, the "Absalon" as gunnery training-ship, the "Ingolf" as boys' training-ship, the "Esbern Snare" as torpedo-schoolship, the gun-boat "Falster" as training-ship for engineers and stokers, the third-class cruiser "Heimdall" for the protection of the Iceland and Faroe Islands Fisheries, and the gun-boats "Grönsund" and "Guldborgsund" for fishery duties in the North Sea. The lighting of the coasts and waterways falls under the Admiralty, and a first vote of 79,000 kronen for the lighting of the Little Belt is demanded, so that vessels can pass through safely at night, as they do at present through the Great Belt. Of the 930,000 kronen of the Extraordinary Budget 426,000 are required for the arming of the "Herluf Trolle," 99,000 kronen for submarine mines, 95,000 kronen for the provision of new guns, and 17,000 kronen for the protection of the Free Harbour.—*Mittheilungen aus dem Gebiete des Seewesens nach Politiken.*

Steam Trials.—The trials of the two new torpedo-boats "Sobjornen" and "Havornen" have been concluded satisfactorily at Copenhagen. They are of the "Haien" type, have a displacement of 143 tons, are 146 feet 6 inches in length, with a beam of 13 feet 6 inches, and engines which develop 2,317-I.H.P., steam being provided by two Thornycroft water-tube boilers. The mean speed maintained during trial was 24 knots. The boats are provided with four discharge-tubes for the 18-inch torpedoes—two in the stem and two on a pivot amidships between the funnels. The armament further consists of a 47-millimetre (3·5-pounder) Q.F. Hotchkiss gun mounted abaft, with a machine gun on the forecastle. These two boats are the first which have been built completely, including the engines and boilers, at the Royal Dockyard. When the boilers and machinery were supplied from Thornycroft's works direct, the cost of the older boats was 400,000 kronen, but the two new ones have been completed at a cost only of 310,000 kronen, or a saving of 22·5 per cent.

Armour-plate Trial.—A very successful trial of a test armour plate for the new battle-ship "Herluf Trolle" lately took place at the Amager proving ground. The plate, which was made by the Glasgow firm of Beardmore and Co., is of chrome nickel steel, but not homogeneous, as the face of the plate contains more chromium than the rear, and is consequently harder. The plate was 8 feet by 6 feet, with a thickness of 6·4 inches, and secured by 8 bolts to an oak backing 24 inches thick, with an inner skin 0·5 inch thick. The plate was fired at five times with a 15-centimetre (5·9-inch) 43-calibre gun at a distance of 240 feet. The plate stood the test well, being only slightly penetrated, with one or two fine cracks at the point of impact. The points of the projectiles in each case remained in the plate, but the rest of projectile shattered. Two shots were afterwards fired with Krupp projectiles fitted with a cap of mild steel, the object of which is to take the shock and lessen the danger of the projectile smashing up. Although good results had been obtained both in Russia and the States with these caps, in this case they made no difference, and the projectiles broke up as the others had done.

Re-Armament of the "Odin."—The reconstruction and re-armament of the "Odin" are now to be taken in hand. Up to the present she has had four 10-inch muzzle-loaders mounted in a central casemate, with two ports for each gun—one for end-on fire and the other for the broadside. Four 10-inch B.L. guns are now to be substituted for the muzzle-loaders, and instead of the two ports for each gun, the casemate will be re-constructed, with a port at each angle, which will allow of the guns having an arc of training from the keel-line to 10° before and abaft the beam respectively. The casemate will be divided in the centre by a bulkhead of 1·5-inch hardened steel, while the funnel from the armoured to the upper deck will also be protected by 1·5-inch hardened steel armour. The old conning-tower, which formerly stood on the after-part of the deck over the casemate, and from which only a very restricted view could be obtained, is to be done

away with, and a new one protected on the fore-side and on the sides by 6-inch, and abaft by 4-inch armour, will be erected forward, and on the bridge over it will be mounted two Maxim guns.—*Marine Rundschau nach Tidsskrift for Søvesen.*

FRANCE.—The following are the principal promotions and appointments which have been made: Rear-Admirals—C. F. E. de Courthille to be Vice-Admiral; J. P. A. Besson to the naval command at Marseilles. Capitaines de Vaisseau—J. P. A. Besson to be Rear-Admiral; G. E. Lecomte to "Marceau"; J. E. Merleaux-Ponty to "Tempête" and command of Naval Division in Tunis and Bizerta; J. A. Mallet to command of Corsican Naval Division; P. A. Hennique to "Isly." Capitaines de Frégate—J. A. Mallet, F. P. Arago, J. L. M. Le Pord to Capitaines de Vaisseau; E. A. Voieillaud to "Achéron"; J. L. Courcelle-Seneuil to command of fixed defences at Rochefort.—*Le Journal Officiel de la République Française.*

Personnel.—Rear-Admiral Courrejolles took over the command of the China station from Vice-Admiral de Beaumont on 2nd February, hoisting his flag on board the "Vauban." His proper flag-ship, the new first-class protected cruiser "D'Entrecasteaux," was commissioned at Toulon on the 15th ult., but she is not yet out of her difficulties, as it is now discovered that her magazines develop a dangerous amount of heat, in spite of all attempts to ventilate them. Capitaine de Vaisseau Merleaux-Ponty, who was Chief of the Staff to Vice-Admiral Gervais when that officer was in command of the Mediterranean Fleet, and is now in command of the "Marceau," has been appointed by the Minister of Marine senior naval officer at Tunis, where he will be quite independent of the admiral commanding in Algeria; he will have important work to do in the supervision of the construction of the arsenal at Sidi-abdallah, Bizerta, and of the forts and batteries to protect this naval base. He is well qualified for the post, having, in 1897, presided over the commission charged with these works. He will hoist his pennant on board the "Tempête" at Bizerta.

Capitaine de Vaisseau Hennique, appointed senior officer in Newfoundland will hoist his broad pennant on the first-class cruiser "Isly" at Brest on 15th March, and not on the "Nielly" as at first intended. The former is a much more powerful vessel, being a cruiser of 4,160 tons and 19 knots speed, the latter being a much older vessel, with 3,300 tons displacement and only 15 knots speed.

General.—The first-class battle-ship "Formidable" is still in the hands of the dockyard at Brest, where the central armoured redoubt on the upper deck for the 16.4-centimetre Q.F. guns is being completed. Her after military mast has also been removed and a light signalling pole substituted. As soon as the "Formidable" is passed out of the dockyard hands her place will be taken by her sister-ship the "Amiral Baudin," where similar alterations will be made. The third-class cruiser "Nielly" is to commission on the 4th April at Brest to relieve the third-class cruiser "Fabert" in the East Indies; both vessels are old and built of wood. The armoured gun-boat "Achéron" has been commissioned to strengthen the *Défense-Mobile* at Bizerta.

Launch.—The torpedo-boat destroyer "Durandal" was launched at Havre on the 11th February. Her dimensions are as follows:—Length, 180 feet 5 inches; beam, 19 feet 5 inches; with a displacement of 300 tons, and a mean draught of 10 feet 6 inches. The engines are to develop 4,800-I.H.P., giving a speed of 26 knots. The armament will consist of two torpedo-tubes, one 65-millimetre (2.5-inch) Q.F., and one 37-millimetre (1.8-inch) Q.F. guns. Work on the armoured cruiser "Jeanne d'Arc," building at Mourillon, are being pushed on as rapidly as possible, with the view of launching the ship in April; she was commenced on the 24th October, 1896, so she will have been 2½ years on the stocks.

Steam Trials.—The torpedo-avisos "Fleurus" is still continuing her official trials at Cherbourg; with the engines developing 1,000-I.H.P., and making

94 revolutions, a speed of 1.32 was attained on a coal consumption of 916 grammes per H.P., per hour; during her 24 hours' trial at 2,000-I.H.P. the mean speed maintained was 15 knots, with a coal consumption of 825 grammes per H.P. per hour, and of fresh water about 7 tons.

Corsica.—The Minister of Marine has decided to apply to the *Défense-Mobile* of the island the new system of grouping, which has been lately adopted for the *Défense-Mobile* of Toulon. By this arrangement each of the six commanders of the torpedo-boats in commission at Ajaccio will have charge of and responsibility for two boats, one second-class boat in commission and one first-class in reserve. The latter will be kept perfectly ready for service at a moment's notice, her complement being made up by the crew of the boat in commission. These first-class torpedo-boats are to go out every quarter to try their engines as also for the instruction of their crews. During the absence of the torpedo-boats in commission on any duty, those in reserve will be in charge of the second-in-command of the *Défense-Mobile*, who has also to be responsible for the seventh first-class boat kept in reserve.

The *Défense-Mobile* of Corsica was mobilised by order of the Minister of Marine on 11th February. It consists of fourteen torpedo-boats, Nos. 98, 99, 176, 177, 178, 62, 64, 123, 124, 126, 134, 135, 169, 185, and the sea-going torpedo-boats "Courreur" and "Sarrazin." The crews were completed by 105 *inscrits maritimes* called out for 28 days' training, during which manœuvres outside and torpedo practice will be carried out.—*Le Temps* and *Le Yacht*.

Programme for Construction for 1899.—The ships proposed to be laid down in 1899 are 28 in number, as follows:—1 first-class battle-ship "A 8," 2 first-class armoured cruisers "C 9" and "C 10," 2 despatch-cruisers (*croiseurs estafettes*) "H 4" and "H 5," 2 torpedo-boat destroyers "M 8" and "M 9," 4 squadron torpedo-boats "N 18" to "N 21," 11 first-class torpedo-boats "P 64" to "P 74," and 6 submarine-boats "Q 5" to "Q 10." The date of completion of these 28 vessels is not yet settled, except the two torpedo-boat destroyers, which are to be finished by 1902. The following vessels are to be constructed at the various dockyards:—

At Brest.—Battle-ships "A 8," armoured cruiser "C 9," and submarine-boats "Q 6" and "Q 7."

At Rochefort.—Cruiser-despatch-vessel "H 4" and submarine-boats "Q 9" and "Q 10."

At Cherbourg.—Submarine-boat "Q 5."

Lorient.—Submarine-boat "Q 8."

The remaining vessels are to be built at private yards.

The plans of the new battle-ship "A 8" are not yet completed, and no fixed sum appears in the Estimates for her.

The armoured cruisers "C 9" and "C 10" are to be of the "Gloire" type, having a displacement of 10,014 tons, a length of 448 feet 6 inches, with a beam of 60 feet; there will be three screws, the engines are to develop 20,500-I.H.P., giving a speed under forced draught of 21 knots, at this speed with a coal supply of 1,500 tons, they will have a radius of action of 1,940 miles, and of 10,400 miles at 10 knots speed. The armament will consist of two 19.4-centimetre (7.6-inch) Q.F. guns, eight 16.4-centimetre (6.3-inch) Q.F. and six 10.1-centimetre (3.9-inch) Q.F. guns, with eighteen 3-pounders, six 1-pounders, and two machine guns; there will also be four torpedo-discharges, two being submerged. The cost of "C 9" will be 21,715,641 francs, and of "C 10" (to be built by contract) 23,573,500 francs.

The two cruiser despatch-vessels, which are of quite a new type, will be of the following dimensions:—Length, 390 feet; beam, 42 feet 3 inches, with a displacement of over 4,000 tons. The engines are to develop 15,000-I.H.P., giving a

speed of 23 knots, steam being supplied by water-tube boilers, their radius of action will be 8,000 miles at 10 knots and 1,330 miles at full speed. Their armament will consist of eight 10-centimetre (3·9-inch) guns, twelve 3-pounder Q.F. guns, and four 1-pounder Q.F. guns, with four torpedo-discharges, two being submerged. The cost of "H 4" (to be built in the dockyard) will be 8,766,468 francs; that of "H 5" (to be built by contract) 8,731,518 francs.

The six submarine-boats will be of the "Narval" type, at present under construction at Cherbourg. They will have a displacement of 106 tons, with a length of 110 feet 6 inches, and a beam of 11 feet 3 inches. They will be driven by a single screw, the engines developing 217-H.P., steam being provided by water-tube boilers; the speed is to be 12 knots. They will have four torpedo-tubes. Their crew will consist of two officers and nine men, and each boat will cost 648,050 francs.

The plan of the torpedo-boat destroyers, the squadron torpedo-boats, and the first-class torpedo-boats, have not yet been settled.—*Annexe H, Budget des Dépenses du Ministère de la Marine.*

GERMANY.—*The Command-in-Chief of the Navy.*—Admiral von Knorr has resigned the position of Commanding Admiral of the Fleet, which he has held with much success for the last three years. As a lieutenant, he commanded the gun-boat "Meteor," and fought an action off Havannah with the French gun-boat "Bouvet," the only naval action during the war of 1870-71; both vessels were crippled and had to draw off into neutral waters. The office of Commander-in-Chief of the Navy has been abolished and the Kaiser will henceforth hold the supreme command of the Navy, as he does that of the Army. The existing staff of the Commander-in-Chief is to be styled the Admiral's Staff, Rear-Admiral Bendemann being appointed its chief. By Imperial decree, Admiral Koester, commanding in the Baltic, has been appointed, in addition, Inspector-General of the Navy. The Kaiser has placed Admiral von Knorr *à la suite* of the Navy and lately conferred on him the unprecedented honour of the Black Eagle, the Garter of Prussia.

The Naval Budget.—The Naval Estimates, Ordinary and Extraordinary, for 1899, amount to 133,413,619 marks (£6,670,680). The strength of the *personnel* of the fleet will be as follows:—1 admiral, 4 vice-admirals, 10 rear-admirals, 48 captains, 93 commanders, 463 lieutenants, 207 sub-lieutenants, 207 midshipmen, 120 naval cadets; 4 staff-engineers, 20 chief engineers, 49 engineers, and 55 assistant-engineers; 1 medical inspector-general, 2 deputy inspector-generals, 23 fleet surgeons, 53 staff-surgeons, 32 surgeons, and 31 assistant-surgeons; 12 fleet paymasters, 92 paymasters, 21 assistant-paymasters, 40 clerks, and 79 assistant-clerks; 298 chief warrant officers, 580 warrant officers, 1,677 chief petty officers, 2,657 petty officers, 4,128 leading seamen, 12,546 men, and 1,000 boys; stokers artificers, and writers inclusive. In addition there are:—1 inspector of Marine Infantry, 2 battalion commanders, 10 captains, 9 first lieutenants, 18 second lieutenants, 16 sergeant-majors, 10 colour-sergeants, 40 sergeants, 95 corporals, 152 lance-corporals, and 886 privates of the Marine battalions, and 98 sergeant-majors, with 60 colour-sergeants as ship's police. There are, further, 26 retired officers, including 1 rear-admiral, holding special appointments.

The following credits for new constructions are demanded:—A fifth and final vote of 4,250,000 marks for the first-class armoured cruiser "Fürst Bismarck"; a fourth and final vote of 4,270,000 marks for the first-class battle-ship "Kaiser Wilhelm II."; a third vote of 4,000,000 marks for the first-class battle-ship Ersatz "König Wilhelm"; a second vote of 5,500,000 marks for the first-class battle-ship "A"; a second vote of 5,500,000 marks for the first-class battle-ship "B"; a second vote of 2,725,000 marks for the first-class armoured cruiser "A"; a second vote of 2,120,000 marks for the small cruiser "A"; a second vote of 2,120,000 marks for the small cruiser "B"; a second and final vote of 750,000 marks for each of the new gun-boats Ersatz "Wolf" and Ersatz "Habicht"; a

first vote of 2,000,000 marks for each of the first-class battle-ships "C," "D," and "E"; a first vote of 1,000,000 marks for each of the small cruisers "C" and "D" a second and final vote of 2,201,000 marks for division torpedo-boat "D 2"; and a first vote of 2,400,000 marks for a second division torpedo-boat; making a grand total of 44,586,000 marks (£2,229,300) for new constructions.

A vote of 10,289,000 marks (£514,000) is required for the guns and fittings of the following new ships:—A fifth and final vote of 500,000 marks for the first-class battle-ship "Kaiser Friedrich III. "; a fifth vote of 750,000 marks for the "Fürst Bismarck"; a fifth and final vote of 250,000 marks for the second class cruisers "Hertha," "Vittoria Louise," and "Freya"; a fourth vote of 1,000,000 marks for the "Kaiser Wilhelm II. "; a fourth and final vote of 500,000 marks for the second-class cruisers "Vineta" and "Hansa"; a third vote of 1,000,000 marks for the Ersatz "König Wilhelm"; a second vote of 2,000,000 marks for battle-ships "A" and "B"; a second vote of 500,000 marks for first-class cruiser "A"; a second vote of 900,000 marks for the small cruisers "A" and "B"; a second and final vote of 580,000 marks for the "Wolf" and "Habicht"; a first vote of 1,500,000 marks for the battle-ships "C," "D," and "E"; a first vote of 300,000 marks for the small cruisers "C" and "D"; a final vote of 296,000 marks for division boat "D 2"; and a first vote of 213,000 marks for new division boat. A further vote of 1,780,000 marks is required for the torpedo equipment of the "Kaiser Wilhelm II.," "Fürst Bismarck," Ersatz "König Wilhelm," first-class cruiser "A," the small cruisers "A," "B," "C," and "D," the battle-ships "A" and "B," and the two division torpedo-boats.

For dockyard works at Kiel, Wilhelmshaven, and Danzig, 1,332,500 marks are required, with a further sum of 4,000,000 marks for the construction of two large dry docks at Kiel, and 300,000 marks for strengthening the Kiel harbour fortifications.

Another important vote is that for 16,324,770 marks for ships in commission, made up as follows:—The battle-fleet in home waters, 6,284,798 marks; ships on foreign stations, 6,180,152 marks; training-ships, 2,958,646 marks; special service, 237,633 marks; special-service ships, 743,541 marks.—*Etat für die Verwaltung der kaiserlichen Marine, 1899.*

The following ships are to be commissioned on the 1st April:—

At Kiel.—The despatch-vessels "Pfeil" for scouting service with the 1st Squadron, and "Blitz" as senior officer's ship with 1st torpedo-boat flotilla; the training-ship "Grille" for the instruction of officers in coast pilotage; the coast-defence battle-ships "Hagen" and "Heimdall," which with the Central Reserve ships "Ægir" and "Odin" will form the Baltic Armoured Reserve Division.

At Wilhelmshaven.—The training-ships "Olga" for fishery-protection duties in the North Sea; the training-ship "Albatross" for surveying duties on the North Sea coast; the coast-defence battle-ships "Siegfried" and "Hildebrand," which with the Central Reserve ships "Frithjof" and "Beowulf" will form the North Sea Armoured Reserve Division.

At Danzig.—The armoured gun-boat "Natter," and at the same time the armoured gun-boat division will be formed. The three new second-class cruisers "Hansa," "Freya" and "Vineta" will complete their trials this spring, and the two first-named will from the 1st July be attached to the Manœuvre Squadron for scouting duties. The cadets' and boys' training-ships "Stein" and "Gneisenau," are also to be commissioned on the 1st April, as well as the fourth-class cruiser "Sperber" for service on the West Coast of Africa.—*Neue Preussische Kreuz-Zeitung.*

RUSSIA.—The following appointments have been made: Rear-Admirals—Beznar, Chief of the Staff of Black Sea Fleet, to be Junior Commander of the Black Sea Squadron; Kuzuich, to be Chief of the Staff of the Black Sea Squadron.

New Ships.—The following are the particulars of the twin-screw cruiser ordered at the Forges et Chantiers de la Méditerranée, at La Seyne, near Toulon:—Displacement, 7,800 tons; extreme length between perpendiculars, 445 feet; extreme beam, 57.1 feet; and draught amidships, 22.1 feet. The hull is being constructed at the yard at La Seyne, the engines at Marseilles, and the boilers at St. Denis, at the works of Messrs. Delaunay, Belleville & Co. When ready, besides a six hours' trial at 14 knots, she will have a twenty-four hours' continuous trial at full power of her engines, when a speed of 21 knots is to be maintained. The expenditure of coal at 14 knots is to be only 1 kilogramme, and at 21 knots 1.15 kilogrammes. If the speed bargained for is not attained, the company will be liable to a fine of 10,000 francs for every tenth of a knot deficient under 21 knots, and the Government have the right of refusal, if the speed falls below 20 knots. The whole cost is to be 16,500,000 francs. There is to be an armour belt of 200 millimetres (8 inches) tapering to 100 millimetres (4 inches) in thickness, while the thickness of armour on the turrets will be 200 millimetres (8 inches). The electricity will be furnished by nine dynamos in three groups, each developing 80,000 watts at 100 volts, and will be used for working the turrets, the ammunition hoists, steering apparatus, and pumps. There are two vertical triple-expansion engines giving at 140 revolutions a total of some 16,500 I.H.P. There will be an 8-inch gun in each of the two turrets, one forward and one aft, and in the casemates and battery deck eight 6-inch and twenty 3-inch Q.F. guns, besides machine guns and torpedo-tubes. The bulkheads of the cabins are to be of steel, and all fittings of metal.

A battle-ship of 12,900 tons is also being built for the Russian Government at the same yard, of which the following are the chief dimensions:—Length between perpendiculars, 388 feet 9 inches; extreme beam with armour, 75 feet 5½ inches; depth, 47 feet 11 inches; draught (on even keel), 26 feet; I.H.P., 16,300. Normal coal supply, 800 tons; entire capacity of bunkers, 1,350 tons. She is to be built to make 18 knots for 12 hours on end, the contractors being liable to a fine of 20,000 francs for every tenth of a knot deficient. Expenditure of coal at 12 knots, 1 kilogramme, and at 18 knots, 1.15 kilogrammes. Armament:—Four 12-inch guns in pairs in turrets, twelve 6-inch Q.F. guns in pairs in broadside turrets, twenty 75-millimetre Q.F. guns (12-pounders) on the gun and upper decks, twenty-eight Q.F. guns of small calibre, and four torpedo-tubes above the water-line. She is to cost, with her armament and all complete, 30,282,000 francs. Electricity will be used for revolving the 12-inch and 6-inch gun turrets. She is to be built after the model of the French "Jauréguiberry" and to have two principal engines with triple-expansion.

As regards the cruisers ordered in Germany, the one ordered at Elbing with an armoured deck, has an extreme length of 347 feet 10 inches, and extreme beam of 40 feet, and is to have a guaranteed speed of 25 knots. She is to have three triple-expansion engines supplied with steam from 12 Schichau boilers in three groups and three funnels. The armoured deck is to reach 1.3 metres below the water-line, the plates of the curved part, being 50 millimetres, and of the horizontal 30 millimetres. She is to cost, without armament, 2,870,000 roubles, and to be ready in September, 1900.

The cruiser ordered at the Germania Works is to have a speed of 23 knots, and to be ready in July, 1900. At the Vulcan Works, near Stettin, a 23-knot cruiser has also been ordered, to be ready by August, 1900. The plans are still, however, under consideration.

Of the four torpedo-vessels christened "Kit," "Skat," "Delphin," and "Kasatka," which are in course of construction at the Schichau Works at Elbing, one is to be ready by the 1st January, 1900, and the other about June in the same year. Their dimensions are as follows:—Length, 200 feet 2 inches; beam, 23 feet; and draught (at stern post), 11 feet 9½ inches; displacement, 350 tons. They will all have twelve water-tight bulkheads on the upper deck, and their hulls

will be built of sheet steel with a zinc coating, varying in thickness from 7 to 4½ millimetres, the steel to have a resisting power of from 35 to 40 tons to the square inch (English), and an elasticity of not less than 15 per cent. They will be twin-screw vessels, with triple-expansion engines, supplied with steam from four Schichau boilers at 16 atmospheres (240 lbs.) working pressure of steam. They are to have two funnels, and an estimated speed of 27 knots, and to cost 472,000 roubles, without armament.

The 350-ton torpedo-vessel "Som," ordered at Laird's Works at Birkenhead, has the following dimensions:—Length between perpendiculars, 213 feet; beam amidships, 21½ feet; and mean draught, 12½ feet. The speed contracted for is 27 knots with full displacement (370 tons). The two triple-expansion engines, of 6,000-I.H.P., will be supplied with steam by four water-tube boilers of the Laird type, a novelty in the Russian Navy. The grate area is estimated at 2 square feet to each unit of H.P. The vessel is to be ready by the 4th October of this year, and to cost £52,000. Her sphere of action at 15 knots, with a coal supply of 80 tons, is estimated at 3,500 miles, and she is to have 9 water-tight bulkheads, and the bow, for greater stability, is to be built with a great bulge.

The following ships, which are in process of construction at the yards named, have by a rescript of the 21st December, 1898, been included in the Navy List and christened:—

Battle-ships.—"Pobieda," building at the Baltic Works. "Retvizan," building at Philadelphia at the Cramp Works. "Tsesarévich," building at the Forges et Chantiers de la Méditerranée, La Seyne, near Toulon.

Cruisers.—"Bayan," building at La Seyne, near Toulon. "Variag," building at Cramp Works, Philadelphia. "Bogatyr," at Vulcan Works at Stettin. "Askold," at Germania Works at Kiel. "Novik," at the Schichau Works at Elbing.

Torpedo-vessels.—Four of 350 tons each, "Kit," "Skat," "Delphin," and "Kasatka," building at the Schichau Works at Elbing. "Som," of 350 tons, at Laird's Works at Birkenhead. "Osetr," "Kefal," and "Losos," of 312 tons, at the Forges et Chantiers de la Méditerranée, at Havre. "Forel" and "Sterliad," of 312 tons, Normand Works at Havre. "Gagara," "Voron," "Filin," and "Sova," of the "Sokol" type, at the Neva Works.

Transport.—"Yenisei," Baltic Works.

The following ships are to be in commission during the current year:—

BALTIC FLEET.

Training Squadron.—For four months' cruising.

First-class battle-ship—"Poltava."

Coast-defence battle-ships—"Admiral Ushakov," "Admiral Senjavine," "General-Admiral Apraxine," and "Admiral Spiridov."

Torpedo-cruiser—"Abrek."

Despatch-vessel—"Ilmen."

Torpedo-boat destroyer—"Sokol" and 11 torpedo-boats of the 2nd Division will be commissioned for three months.

Gunnery Training Squadron.—For four months' cruising.

First-class armoured cruiser—"General-Admiral."

Coast-defence monitors—"Pervenets," "Kreml," "Admiral Greig."

First-class gun-boat—"Groja."

Torpedo-cruiser "Voievoda," and 2 torpedo-boats will be commissioned for two months.

Torpedo Training Squadron.—For four months.

Second-class cruiser—"Africa."

Torpedo-cruiser—"Lieutenant Ilyin."

Torpedo-depôt ship—"Europa."

Training-ship—"Dwina," 3 torpedo-vessels, and 4 torpedo-boats.

Training Squadron for Naval Cadets.—For three months.

First-class armoured cruiser—"Kniaz Pojarski."

Second-class cruiser—"Rynda."

Training-ships—"Viernji," "Moriak."

Second-class cruiser—"Asia" for four months.

Engine-room Staff Training-ships.—For four months.

Coast-defence battle-ship—"Nie Tron Menia," and torpedo-boats No. 16 and 49, with 2 boats for experiments with patent fuel.

BLACK SEA FLEET.

Evolutionary Squadron.—For four months.

First-class battle-ships—"Tchesme," "Sinope," "Dveanadsat Apostolov," "Tri Sviatitelia."

Torpedo-cruisers—"Kapitan Sacken," "Griden," "Kasarski."

Torpedo-depôt ship—"Dunai," and 6 torpedo-boats. All these, except the torpedo-boats, will be for the remaining eight months in the Reserve. The new second-class battle-ship "Rotislav" will be commissioned for three months for engine trials. In the Reserve but ready for sea are the first-class battle-ship "Ekaterina II." and "Georgii Pobiedonosets."

Various Training Purposes:—

Second-class cruiser—"Pamjat Merkuria."

Transport—"Bug."

Training-ships—"Dniester" and "Pruth," 3 torpedo-vessels, and 1 torpedo-boat.

CAUCASUS FLOTILLA.

Astrabad Station.—Eight months: first-class gun-boat "Pistchal"; and twelve months: steamer "Tchikischlar."

Port of Baku.—All the year: steamers "Geok-Tepé," "Baku," and "Krasnovodsk"; sea-going gun-boat "Siekiva"; sloop "Provornyi."

SIBERIAN FLOTILLA.

Torpedo Training.—Transport "Aleüt"; and 8 torpedo-boats.

Trial of Engines.—Torpedo-boats No. 201, 202, 208, 209, 210, and 211.

Port Arthur.—Port-ship "Silach," torpedo-boats No. 203, 204, 206, and 207, a tug and a dredger.

PACIFIC OR CHINA STATION.

Second-class battle-ships—"Navarin," "Sissoi Velikie."

First-class armoured cruisers—"Rossia," "Rurik," "Pamjat Azova," "Dimitri Donskoi," "Vladimir Monomakh."

Second-class cruisers—"Admiral Kornilov," "Zabiaka," "Rasboinik."

Torpedo-cruisers—"Vsadnik," "Gaidamak."

First-class armoured gun-boats—"Otvajny," "Gromiastchy."

First-class gun-boats—"Koriets," "Mandjour," "Si voutch," "Bobr."

Transport—"Yakut."

MEDITERRANEAN.

Battle-ship "Imperator Alexander II.," and torpedo-vessels 119 and 120.

En route to Mediterranean.

Torpedo-cruiser—"Abrek."
First-class armoured gun-boat—"Khrabryi."
First-class gun-boat—"Teretz."

Returning from Mediterranean.

Torpedo-cruiser—"Posadnik."
First-class armoured gun-boat—"Groziastchy."
First-class gun-boat—"Donetz."

En route to Pacific.

First-class battle-ship—"Petropavlovsk."
First-class armoured cruiser—"Admiral Nakhimov."
First-class gun-boat—"Giljak."

Cruising for Instruction of Quarter-masters.

First-class armoured cruiser—"Herzog Edinbourgski."
Second-class cruiser—"Djighite."

Constantinople.

First-class gun-vessel—"Tchernomoretz."
Steamer—"Kolkhida."
Cutter—"Buyuk Dere."

*Galats.—Transport—"Psezuapi."**For Protection of Commerce in Frozen Ocean.—Transport—"Bakan."*

	1899.	1898.
<i>Estimates:—</i> Central and port administration ...	1,965,027	1,826,300
Salaries and grants	504,510	461,357
Education	894,222	753,458
Medical and hospital service	978,118	895,655
Pay of combatant branches	4,453,211	4,357,052
Rations, etc.	1,247,803	1,034,616
Uniforms	1,063,142	1,804,475
Cruising of ships in commission ...	11,758,775	11,180,179
Hydrographic branch	996,022	706,247
Guns, torpedoes, and electric lighting...	9,198,720	8,317,354
Construction	34,062,537	19,316,976
Yards and naval arsenals	4,038,929	4,369,637
Rent and maintenance of buildings and cost of construction	3,584,685	4,193,977
Detachments	729,000	732,900
Various items	1,242,905	1,170,767
Construction of Port Alexander III., and improvement of harbour at Vladivostok	5,200,000	5,700,000
Items belonging to next year's Estimates	247,394	230,054
Total Roubles	83,065,000	67,050,004

General.—The Naval Technical Committee after inquiry has decided to replace the iron tubes for heating by steam with copper ones, and accordingly these will be supplied to the battle-ship "Rotislav" by the Lazarev Admiralty Works.

We learn from Odessa that the Volunteer Fleet has instituted a competition between English and German firms for the building of two new cruisers, one

of the type of the "Moskva," the other for the conveyance of transported convicts. They are to cost some 3,000,000 roubles.

The ships companies comprise 13 admirals, 1,408 staff and superior officers, 376 engineer mechanics, 161 surgeons, 41 chaplains, 713 midshipmen, cadets, and students, and 36,834 petty officers and men.

The trial of the engines of the "Rotislav" is considered an event of importance, as it is the first time that patent fuel has been employed on any large scale, the pulverisation being effected, not by steam as heretofore, but by mechanical means. The results are considered most satisfactory, the engines having developed a considerably greater power than that contracted for during a six hours' trial. It is looked on as great triumph for Russian mechanical skill. Similar trials on board torpedo-boats have shown the very great superiority of mechanical pulverisation to that by steam.

We notice that under the auspices of the Grand Duke Alexander Mikhailovich and Prince Battenberg, the naval war game invented by Mr. Jane has been introduced into Russia, and is in high favour with officers.

We notice the translation of Captain Mahan's work "The Influence of Sea Power on the French Revolution and the Empire" into Russian, the second volume having recently appeared. The Grand Duke Alexander also publishes a work on "Damage to Ships and how to repair it with the means on board." Vice-Admiral Makarov contributes some highly instructive portions to this work.

The Naval Cadet College is shortly to celebrate its bicentenary. Peter the Great was the founder, he being at that time the only man in Russia who was an authority on naval matters. When in London in the year 1698, he gave orders that a good teacher of mathematics and naval science should be sought out, and accordingly Professor Farquharson, of Aberdeen University, was presented to him, and at his instance determined to enter the Russian Service. This Farquharson was not only a mathematician, but a great astronomer and master of navigation. He took with him as assistants Stephen Gwyn and Richard Gries, and these three founded, on the 19th August, 1699, the School of Navigation. It was to come under the orders of the Arsenal, and its chief, Feador Golovin, and its pupils were to consist of "such as voluntarily offered themselves, and others brought in by compulsion." It was at first to be housed in what was called the "Drapers' Court," but as the English found these buildings too low for astronomical purposes, they were given in June, 1701, the Strietenski Tower, with all the buildings and ground appertaining to it.—*Kronstädtski Viēstnik*.

MILITARY NOTES.

PRINCIPAL APPOINTMENTS AND PROMOTIONS DURING FEBRUARY, 1899.

Brevet Colonel J. O. Quirk, C.B., D.S.O., to command the 41st Regimental District. Lieut.-General Sir H. Brackenbury, K.C.B., K.C.S.I., to be Inspector-General of Ordnance at Head Quarters, with the temporary rank of General. Lieut.-General Sir E. Markham, K.C.B., appointed Governor and Commandant of Royal Military College. Brevet Colonel J. P. Brabazon, C.B., A.D.C., to be Colonel on the Staff to Command a Cavalry Brigade. Colonel B. Duff, C.I.E., Indian Staff Corps, to be Assistant Military Secretary for Indian Affairs at Head Quarters. Major-General Sir G. Corrie Bird, K.C.I.E., C.B., to be Lieut.-General. Colonel R. M. Clifford to be Major-General. Lieut.-Colonel C. H. W. Cafe, h.p., to be Colonel. Major-General R. C. R. Clifford, C.B., to be Lieut.-General. Colonel H. P. Stewart to be Major-General. Lieut.-Colonel G. R. Stone, h.p., to be Colonel.

HOME.—The Militia returns for last year, which have been issued as a Parliamentary paper, state that the enrolled strength was 113,439, and the number at training 98,042, the former figures showing a decrease of 1,149 from those of 1897 and the latter of 1,432. Of the 15,397 absent from training 7,240 had leave and 8,157 had not. The 1898 establishment was fixed at 132,493, or 1,009 less than that of 1897, and the number of men wanting to complete the establishment last year was 19,054, or 140 more than were wanting for the higher establishment of 1897. In England and Wales there were last year 73,659 enrolled Militia—decrease, 1,100; in Scotland, 13,684—443; and in Ireland, 26,096—increase, 394. Taken by arms the number of officers and men on the rolls in 1898 were:—Artillery, 16,886—decrease, 113; engineers, 2,098—increase, 74; infantry, 94,114—decrease, 1,059; and Medical Staff Corps, 341—decrease, 51. The 31,105 men of the Militia Reserve effective at last year's inspections, and included in the above reckonings, were 44 fewer than at the 1897 inspections, but the 5,970 enrolled in the Militia Reserve in 1898 are 598 more than in the previous year.

The Military Manœuvres, 1898.—The following report has been made by a committee appointed by the War Office to discuss the question of improvements which may be made in the conduct of future manœuvres, on the experience of those which took place last autumn on Salisbury Plain:—

The committee submit the following suggestions and recommendations:—

1. The Director of Manœuvres should be the Umpire-in-Chief, the Directing Staff should prepare the scheme or schemes, select camping grounds, and act as umpires. Everyone wearing the badge should be told off to definite umpire duties.

2. Whatever rules for the conduct of field manœuvres are in force at the time should be adhered to; it is undesirable to issue new or modified rules just before manœuvres. In large manœuvres umpires' decisions should be directed more to producing delay than to placing troops out of action, and this should be laid down in the rules.

3. Hardship is inseparable from war, and a certain amount of it may be considered inseparable from realistic manœuvres.

The committee doubt the necessity of elaborate previous preparation of camping grounds; a force of engineers (with necessary equipment) at the disposal of the Directing Staff should be able to complete within 24 hours the watering arrangements of and access to camps previously reconnoitred.

When the forces are at a distance from each other, sites for camps can be selected by the Directing Staff without regard to secrecy. When the forces come into contact some latitude is desirable, and probably three groups of camps should be prepared instead of two, so that as far as possible the encampment of the troops after an action may coincide with the result of the fight.

In the absence of special instructions, or unless an armistice is declared, a state of war should be considered to exist from the commencement of hostilities. In operations of cavalry and of outposts two methods may be taken into consideration as subsidiary to the ordinary camping system:—*a.* Cantonments. *b.* Bivouacs, or a combination of them.

a. Cantonments, which are in constant use in Continental Armies, are not unknown to us. Volunteers during the manœuvres at Easter, Whitsuntide, etc., frequently canton by private arrangement, and the Cavalry Brigade at Aldershot cantoned round Winchester for three nights consecutively in June, 1897. Some extra arrangements are required, such as latrines, kettles, etc.

b. Bivouacs depend entirely on the weather. In weather such as prevailed in 1898 there is no difficulty; a blanket is all that is required. The men can bivouac after their dinners, or cook them in mess tins whilst in bivouac, carrying their rations as on service.

4. Supply is simple if the sites for camps are fixed beforehand, but requires prevision when they are not. The chief difficulty then is the supply of vegetables, milk, butter, cheese, etc., which are ordinarily issued through the dry canteen, and the beer and temperance drinks of the wet canteen.

The vegetables, milk, butter, etc., of the dry canteen, the beer and barrelled ginger-beer of the wet canteen, and the bread and meat of the Army Service Corps should be combined in a supply column. This supply column should either move with the ordinary baggage columns, or if circumstances—such as propinquity to the enemy—require it directly under the orders of the Directing Staff. It should, in the latter case, be neutral. There should be two supply columns for each force, one of which would be filling up at the supply depôt while the other was with the troops.

Dry Canteens.—The issues from these should be limited. The vegetables conveyed should be reduced to what is absolutely necessary—*i.e.*, potatoes, peas, rice, etc. A limited selection of other articles, including tobacco, matches, jams, herrings, etc., being taken by each battalion, at its discretion, up to the capacity of the transport allotted.

Wet Canteens.—Each battalion should convey its beer and temperance drinks, calculated at three pints per man, with its baggage. A brewer's dray can carry enough for about one-and-a-half days. The supply will therefore require replenishing about twice in three days, and brigadiers should be responsible that the necessary transport is at the disposal of the Directing Staff.

Officers' Messes.—Rations should be drawn, and mess wagons should march with the baggage, supplies being replenished on the lines of the dry canteens.

5. The committee believe these proposals to be practicable; their result would be the abolition of canteens in their present form at manœuvres, substitution for them of the supply of a liberal ration; the forces would be mobile and there would be real practice in supply duties while the canteens would be maintained.

As regards transport, a battalion can move, carrying its own beer and groceries, with one G.S. wagon and one private cart (dry canteen), carrying one marquee, one brewer's wagon carrying about one-and-a-half days' supply of beer and temperance drinks.

Depôts for replenishment of supply columns would have to be arranged by the Directing Staff in convenient situations; at each of these there would be a contractor's staff for the supply of dry and wet canteen goods, as well as Army Service Corps supplies and firewood.

6. Schemes for manœuvres of small bodies should have in view the training of company leaders, non-commissioned officers and men; those for manœuvres of large bodies should aim at giving instruction to superior commanders and staff officers, and such manœuvres should, therefore, include practice in timed marches, outposts, tactical deployments, conduct of baggage and supply columns, supply of ammunition, extensive reconnaissances of positions, or in some of them. At all manœuvres the troops should be allowed to expend ammunition freely.

Ground suitable for manœuvring in England often contains one or more very strongly-marked features, such as chalk escarpments, etc. The committee think that in areas comprising such features schemes will be found to give the best results which direct the march of opposing forces on lines parallel to, rather than across, such features.

The frequent introduction of imaginary troops into schemes is to be deprecated. It is impossible for commanders to estimate their real effect, and considerable confusion of thought is created. To obviate their use it is preferable that one side should be inferior in numbers, or that a third force should be at the disposal of the Directing Staff to reinforce one side or the other, or that skeleton troops should be employed.

7. General ideas should be understood as giving the situation at the commencement of the operations only. They may be varied as the situation may demand, provided the same main objective be maintained. The essential point is that the General and Special Ideas shall not conflict and shall be equally comprehensible by each commander.

8. Special ideas should usually take the form of an instruction to each commander giving as much knowledge of the position and probable intention of the other as in war he would have obtained by the previous operations, and leaving him a free hand or giving him an object as circumstances require. This instruction should always name the hour at which hostilities recommence for each force for the day—*i.e.*, the hour at which the troops may march from their camps. This is preferable to indicating the intended situation at a given time, as it ensures that each commander receives practice in the deployment of his troops for battle, which he will not get if he has merely to bring them up to an arbitrary line by a given time. It is recognised that this might prevent a battle taking place on a selected spot, but the forces will meet on war conditions, and full advantage will be derived from the powers of manœuvring given by the Manœuvre Act.

9. The conference should be held as soon as the situation becomes unreal. The Director then gives his decision, and indicates to each commander the camp or camps he is to occupy. It will usually be found that one if not both of the commanders can proceed to their camps in formations and under conditions resembling those they would have to adopt in a parallel case on actual service.

The committee think that the decision of the Director of the Manœuvres should inform both commanders whether either has gained any decided advantage over the other. In addition to this the unsuccessful commander should be told to what distance he should fall back, and the successful one to what extent he may pursue his advantage.

The condition of the troops, the situation of the camping grounds, the position of baggage columns and supply depôts would of course affect the decision as well as the day's operations. An immediate armistice, or a rear-guard action, or a simple movement of cavalry to keep touch would then according to circumstances close the day's proceedings, and the opposing forces would occupy their camps under the conditions dictated by the decisions of the Director of the Manœuvres.

10. The damage question is a serious one. In the opinion of the committee it will be best met by the appointment of a selected military damage officer for each side, with a civil assessor, who would be paid by Government and should be a surveyor of recognised standing in the district.

The duties of the military officer would be to admit damage as a fair claim, and to pay immediately any small sums so admitted. Large damages would of course be paid later after full examination and inquiry.

The committee do not think that signalling officers are of any use for this purpose, nor that commanding officers can be expected to report all the damage their troops commit.

The actual question of how far damage should be permitted is a still more difficult one. Probably the best way is to recognise, as a tacit understanding, that damage will be restricted to a minimum on all days except one or two, on which officers will be expected to move their men under service conditions.

ARTHUR, General, *President.*

REDVERS BULLER, General

A. WYNNE, Colonel

H. S. G. MILES, Colonel

W. H. BIRKBECK, Major, 1st Dragoon^g Guards,

} *Members.*

Secretary.

January 5th, 1899.

Memorandum of the Secretary of State relating to the Army Estimates for 1899-1900.—The increase of the Army, which was begun under the programme of 1897-98, and largely developed under the programme of 1898-99, was shown in my memorandum which accompanied the Estimates of last year to involve when completed an addition of 25,083 of all ranks. To this must be added certain further increases now proposed and explained below.

The following table shows the establishment of the various arms of the Service in 1896-97 (*i.e.*, before the increase was entered upon), the establishment in 1898-99 (*i.e.*, that which was laid down to be reached by the 31st of March of this year), the establishment which is now laid down to be reached by the 31st of March, 1900, and the completed establishment which it is hoped to reach by 31st March, 1901 :—

REGIMENTAL ESTABLISHMENTS (ALL RANKS, EXCLUSIVE OF INDIA) SHOWING THE NUMBER PROVIDED FOR IN EACH YEAR.

	1896-97.	1898-99.	1899-1900.	1900-01.
Cavalry	13,326	13,653	14,233	14,233
Horse and Field Artillery	9,046	10,414	11,461	12,502
Garrison and Mountain Artillery	14,240	15,770	16,498	17,226
Foot Guards	5,920	7,828	8,765	8,765
Infantry of the Line	82,048	87,100	90,041	93,563
Royal Engineers	7,499	7,747	7,919	7,919
Army Service Corps	3,856	3,803	4,325	4,844
Royal Army Medical Corps	2,569	2,642	2,792	2,792
Other Departmental Corps	2,091	2,145	2,191	2,191
West India Regiment	2,223	3,234	3,334	3,334
Other Native Corps	3,218	3,331	3,341	3,341
Malta and other Colonial Militia	1,362	2,472	2,732	2,732
Total	147,398	160,139	167,632	173,442

The progress towards the increased establishment which has been made during the year can best be shown by comparing the actual strength of the Army on the 1st of January of this year, the latest date for which complete returns are available, with the corresponding figures for 1897 and 1898.

ACTUAL STRENGTH (ALL RANKS, EXCLUSIVE OF INDIA) ON 1ST JANUARY.

	1897.	1898.	1899.	Decrease since Jan. 1897.	Increase since Jan. 1897.
Cavalry	13,516	12,909	13,467	49	...
Horse and Field Artillery	8,166	9,332	10,195	...	2,029
Garrison and Mountain Artillery	13,853	14,513	15,722	...	1,869
Foot Guards	5,851	6,591	7,249	...	1,398
Infantry of the Line	81,610	81,885	87,085	...	5,475
Royal Engineers	7,485	7,448	7,637	...	152
Army Service Corps	3,847	3,859	3,841	6	...
Royal Army Medical Corps	2,699	2,651	2,853	...	154
Other Departmental Corps	2,008	2,010	2,109	...	101
West India Regiment	2,223	2,433	2,854	...	631
Other Native Corps	3,218	3,233	3,265	...	47
Malta and other Colonial Militia	1,261	1,813	2,041	...	780
Total	145,737	148,677	158,318	55	12,636

The above table shows the large increase during the year 1898 of nearly 10,000 men, and seems to point to the rapid and easy completion of the augmentation. But as a gauge of what we may expect in the near future, these figures must be received with caution. It must be borne in mind that during 1898 some 4,500 Reservists returned to the Colours. The order permitting return to the Colours is still in force; but no such inflow as took place when permission was

first given can be looked for this year, and so far as can be judged at present, the inflow from the Reserve during the year 1899 will not exceed 2,000 men. On the whole, provided that we are able to continue recruiting at the same rate as in 1898, we may look for steady, if less rapid, progress towards the augmented establishments.

It appears from the evidence given by the men themselves that the large majority of those who have returned to the Colours from the Reserve were in employment at the time when they rejoined; and the fact that only 4,500 Reservists have availed themselves of the chance of further military service is satisfactory as a proof that the great bulk of the Reservists are settled in civil life. These 4,500 men have been a most valuable element of strength to the Army during a time of exceptional strain. Their return to the Colours also serves to mitigate the effects of the abnormal outflow to the Reserve which has been taking place during the past year, and is likely to continue for another year or two. This abnormal outflow is due to heavy recruiting 7 or 8 years ago. So long as it continues there need be no apprehension that the permission to return to the Colours will lead to any undue depletion of the Reserve. The strength of the Reserve on 1st January, 1899, amounted to 78,798 men, and there is every prospect of its increasing during the year to about 85,000, or, allowing for 2,000 returns to the Colours, to 83,000.

During the year 1898 a total of 40,729 recruits was obtained for all branches of the Regular Army, as against 35,015 in 1897 and 28,532 in 1896. Or taking British recruits alone, the number was 38,418, as against 33,722 in 1897 and 27,809 in 1896.

The number of recruits enlisted up to the standard of height and chest measurement was 25,435 in 1898, as against 23,946 in 1897 and 22,781 in 1896. It is obvious, therefore, that the heavy recruiting of 1898 is partly due to an increase in the number of those specially enlisted below the standard but likely to develop into efficient soldiers. The proportion was nearly 34 per cent. in 1898, as against 29 per cent. in 1897. It is, however, satisfactory to know that the bulk of these "specials" attain the full standard within a few months of their enlistment.

The British Army of occupation in Egypt has reverted to the same strength as before the Sudan Expedition. But the occupation of Crete, and the large force which we maintain in South Africa, continue to form a heavy tax upon our resources, both in men and money.

To take the various arms of the Service in turn—

A considerable increase is proposed in the establishment of the Cavalry in order to facilitate the working of the new organisation, in a manner consistent with the pledges given in Parliament last session. For the purpose of supplying drafts for the large number of regiments now serving abroad without drawing on those home regiments which are kept at a war establishment, it is proposed to increase each of the regiments at home, on the lower establishment, by 60 men and 20 horses, and to make a considerable increase in the Cavalry Depot. This accounts for the increase of 580 men shown in the Table of Establishments above.

It is intended, by the adoption of these steps, to obtain for the higher establishment regiments at home complete immunity from liability for drafts whether of men or horses, and to secure that the lower establishment regiments shall be able to provide, without undue depletion, the drafts which it will be their duty to train and supply.

It was always recognised that some time must elapse before the system lately introduced could be made to work satisfactorily. It is obvious that considerable difficulties must be experienced in applying it to a force divided irregularly into corps of various size, and working on a roster which cannot be suddenly altered.

The following table shows the establishments of the home regiments as now proposed, compared with those in force five years ago :—

	Higher establishment.			Lower establishment.		
	Number of regiments.	Men (rank and file).	Horses.	Number of regiments.	Men (rank and file).	Horses.
1899	8	609	465	8	560 ²	363
1894	6 ¹	600	410	7 ¹	372 ³	280
Increase ... ..	...	9	55	...	188	83

Of the 15 new batteries of Field Artillery to be horsed and manned under last year's programme, four of the five which were to be undertaken at once have been raised, and are now on service, while the fifth will have been raised by the 31st of March. Five more are now in hand, and will, it is hoped, be completed by the end of the financial year 1899-1900.

Progress is being made towards building up the re-established dépôts of Horse and Field Artillery.

It is proposed to employ, as a tentative measure, Reservists and discharged soldiers as grooms and for other duties of a quasi civilian nature in the Garrison Artillery. This will set free a number of Garrison Artillerymen for the performance of their purely military duties, and increase the efficiency of that arm of the Service. The object of this measure is to relieve the strain to which the Garrison Artillery at home has been subjected owing to the employment of a much larger force abroad. Corresponding additions to the strength of the force at home are being gradually carried out.

The augmentation of the Guards is proceeding steadily. The new battalion of the Coldstream Guards has been formed, and was lately increased from four to five companies. Two companies have been added to each of the two battalions of the Scots Guards, to form the nucleus of a third battalion.

Three of the six new Line battalions included in the programme of last year have been raised, and are now on service in the Mediterranean. This has materially relieved the strain upon the Army, and contributes towards a re-establishment of the proper proportion between the home and foreign battalions. The raising of the other three new battalions will be shortly taken in hand.

The option of enlisting for three years' Colour service, and nine years' Reserve service, which was extended last year to the Infantry of the Line, has, in the ten months during which the option has been given, been taken advantage of by 3,840 recruits in that branch of the Service. It is as yet too soon to say what proportion of these will pass to the Reserve at the end of three years, and what proportion will extend for longer, and more general, service at full rates of pay.

Progress has been made towards the strengthening of each home battalion by 80 men, which was one of the features of last year's programme. The home battalions (excluding those regiments in which new battalions are being raised) showed, on 1st January, 1899, an average increase of 58 men as compared with 1st January, 1898.

A considerable increase, amounting to 40 officers, 1,000 men, and 447 horses, of which half are provided for in these Estimates, is proposed in the establishment of the Army Service Corps. This increase is urgently required, partly to supply the necessary *personnel* for transport on mobilisation, partly to provide for the

¹ There were four regiments at home on intermediate establishments in 1894.

² Liable to supply drafts to regiments abroad.

³ Not liable to supply drafts.

heavier peace duties due to the general increase of the Army. The need for this increase was emphasised by the experience gained during the manœuvres of last year.

An increase of the Royal Army Medical Corps is the inevitable corollary of the general augmentation of the Army. 18 additional officers and 150 men are taken in this year's Estimates for this purpose.

Besides the additions to the Army referred to above, native battalions are being raised in West Africa, in British Central Africa, and in China. The employment of these forces, as part of the garrison of some of our foreign stations, will help to lighten the burden which now falls so heavily on the British home Army. If the establishment of these regiments be added to the contemplated increases shown above, the total increase to the Army now in prospect amounts to nearly 30,000 men.

The new terms of service have proved very generally acceptable to the men. From the latest information available, it would appear that practically all of those qualified by age and service have already accepted the 3d. a day messing allowance, and thereby given up their claim to further deferred pay on the old scale.

Under the Act of last Session, 1,750 men of the Army Reserve have, up to the 1st of February, 1889, accepted 1s. a day special reserve pay for the first year of reserve service with the liability of recall to the Colours in minor emergencies. There is every reason to suppose that the class will shortly reach, and will without difficulty be maintained at its full authorised strength of 5,000 men. It will, at any moment, be possible to recall these men to the Colours for the purpose of completing a small expeditionary force, and without having resort to the inconvenient procedure which must, under the existing law, be followed, when the ordinary Reserve is called out in time of great emergency.

The order under the same Act permitting Militia corps and individual Militiamen to volunteer for temporary service with the Regular Army has been promulgated. But until after next training season it will not be possible to say to what extent advantage will be taken of it.

In connection with a general revision of our schemes of defence, a thorough examination has been made during the past year of the condition of the armament of our defences at home and abroad. This enquiry has revealed the necessity of carrying much further than hitherto contemplated the process of replacing muzzle-loading guns, which now form so large a proportion of the armament, by a smaller number of modern breech-loading and Q.F. guns.

In concert with the naval authorities, a scheme of re-armament has been drawn up based on a consideration of the nature of attack to which each station is liable, and of the importance attached by the Navy to its defence. A satisfactory feature of the scheme when completed will be a material reduction in the number of Garrison Artillerymen required to man our defences in time of war. It is proposed to defray the cost of the works by loan, and that of the guns, mountings, ammunition, and stores from the annual Estimates.

A scheme has been prepared for providing the barracks which will be required by the additional troops now being raised, and for further improving the existing barrack accommodation of the Army. A Bill will shortly be introduced to provide for this by loan, to be repaid by means of a terminable annuity charged on Army Estimates. The main feature of the scheme will be the erection of barracks for a considerable body of troops on Salisbury Plain, so that the fullest advantage may be derived from the large area of land recently acquired there for manœuvring purposes. Money will also be taken for the completion of other large camps, for adding to and improving existing barrack accommodation at home, and for increasing the barracks abroad at those stations where it has been decided to augment the garrison. The loan will include a sum on account of the necessary works for the revised armament referred to above.

The total of the Army Estimates for the current year 1898-99 amounts to £19,220,500. But this figure was only arrived at by providing for various prepayments in relief of the Estimates for 1898-99 by means of a Supplementary Estimate in 1897-98. These prepayments amounted to £766,000, and were for the following services :—

Half Volunteer Capitation Grant	...	...	...	...	£263,000
Stores	...	...	...	...	293,000
Clothing	...	...	...	...	150,000
Provisions, etc.	...	...	...	...	60,000
Total	...	...	...	...	£766,000

Thus the real provision on account of 1898-99 amounted to £19,986,500.

The net total of the Army Estimates for 1899-1900 amounts to £20,617,200. But to this must be added the following amounts provided for by Supplementary Estimate during the current financial year in relief of expenditure in 1889-1900 :—

Half Volunteer Capitation Grant	...	...	...	...	£261,000
Clothing	...	...	...	...	75,000
Stores	...	...	...	...	25,000
Total	...	...	...	...	£361,000

Adding this to the £20,617,200, a total of £20,978,200 is arrived at, which is the proper total to compare with £19,986,500 (*i.e.*, the real amount of the Estimate for 1898-99). This comparison shows an increase of £991,700, but as there will be a saving of £100,000 in next year's Estimates, due to the smaller scale of the manœuvres which it is proposed to hold this year, the real difference to be explained is £1,091,700.

The following is a summary of the principal increases :—

1. Automatic increase on account of additions to the Army, commenced in the last two years, as stated at page 5 of my memorandum of the current year's Estimates	...	...	...	...	£314,000
2. Further additions to the Army (British and Native) now proposed	...	...	...	...	169,000
3. Armaments and stores	...	...	...	...	299,000
4. Clothing services (Regular Forces)	...	...	...	...	137,000
5. Works (including Barrack Act annuity)	...	...	...	...	196,000
6. Militia and Volunteers	...	...	...	...	41,000
					£1,156,000

Less decreases, War Office (£3,500), non-effective votes (£16,500), and miscellaneous items (£44,300) 64,300

Net increase £1,091,700

It will be seen from the above that, excluding the automatic increases for the additions to the Army (£314,000), and the Barrack Act annuity (£51,000), the actual increase is £726,700.

The following statement gives a more detailed explanation of the increases under the various votes :—

The increase of £238,000 on the Vote for Pay is due to the provision of the pay, etc., of the further instalments of men to be raised under the programmes of 1897-98 and 1898-99, as well as for the additions to the Army and other changes described above.

A larger provision is required for the pay of the officers of the Royal Army Medical Corps, whose numbers will, it is expected, more nearly approach the establishment (now augmented) than has been the case in recent years.

Most of the increase under the Militia Vote is for extra training and bounty to be received by the special section of the Militia Reserve, created under the Act of last Session. To improve the efficiency of the Militia non-commissioned officers, provision is made to enable Militia sergeants to attend for a month's additional training with the Regulars. With a view to lightening the expenses of Militia officers, a sum of money has been provided to admit of a small grant to each battalion, in aid of the cost of maintaining a band.

The increase on the Volunteer Vote is partly automatic, additional sums being required for outfit allowance, and for the expenses of Volunteer officers attending schools of instruction. A small sum is also provided for the purpose of enabling Volunteer corps to hire transport in order to practise transport duties.

The net increase of £79,600 on the Vote for Transport is partly for additional land and sea transport in connection with the augmentation of the Army, and partly for purchase of horses for the addition to the Cavalry and the Army Service Corps already mentioned.

The increase on the Supply Vote is entirely accounted for by the additions to the Army, and would, as also would Vote 6, have been still larger but for the saving on manœuvres.

The real increase under the Clothing Vote, taking into account the Supplementary Estimates of 1897-98 and 1898-99, is £166,000. A portion of this is due to the additions to the Army, and to increased prices of cloth and boots. Provision is also made for additional issues of clothing to various branches of the Service, including the Militia.

Amongst the principal items provided, are an annual issue of ankle-boots to the Cavalry soldier, who at present, after the issue of one pair on enlistment, has to replace them at his own expense; an issue of serge trousers and an extra tartan frock for the Cavalry and Artillery, to make good exceptional wear and tear, and an annual issue of one pair of canvas shoes to the Regular Infantry.

The real increase on the Vote for Warlike Stores, as compared with 1898-99, taking into account the Supplementary Estimates of 1897-98 and 1898-99, is £299,000, which is mainly due to the programme of armaments referred to above. £431,000 is taken in the Vote as the first instalment of that programme.

The Estimates for 1898-99 included provision for six batteries of field guns, and it was intended to include a like number in the Estimates of the two following years. Of the total of 18 batteries of guns, 15 are to be horsed and manned as part of the increase of the Army, the remaining three constituting a proportionate increase to the reserve of guns. It was subsequently thought desirable to provide the whole of the 18 batteries of field guns during 1898-99, and orders were given for their early completion.

All batteries of Horse and Field Artillery are being converted to a quick-firing system, and the conversion is proceeding with rapidity. The increased rate of firing which will be obtained with the new system makes it necessary to provide a larger supply of ammunition and of wagons to carry it in the field; suitable provision has been made for this purpose in the Vote.

The increase on the Works Vote is partly automatic, owing to the necessity of providing for a further annuity in repayment of sums borrowed under the Barrack Act of 1890.

Additional provision is also necessary for new services, many of which are for drainage and sanitary improvements of an absolutely indispensable nature. The sums taken in late years for the up-keep of barracks have not been sufficient to prevent serious deterioration in the condition of many of the buildings.

The increase on the Miscellaneous Vote is due to the issue of a medal to all the troops, British and Egyptian, who have taken part in the operations in the Sudan during the last 3 years.

The War Office Vote, which has been steadily decreasing during the last few years, shows a further diminution owing to reductions in the higher grades of the

military and civil establishments. A departmental committee has been appointed to consider the distribution of work within the Office, and to report as to the changes which may be necessary in consequence of the adoption of the greater part of the recommendations made last year by Mr. Brodrick's committee.

There is this year a reduction in the charge for pensions both of officers and men. These Votes are beyond our immediate control and fluctuate considerably from year to year.

February 17th, 1899.

LANSDOWNE.

INDIA.—The various Asiatic companies of the Royal Artillery have recently been organised into two battalions, viz., the Hong-Kong Battalion and the Ceylon and Mauritius Battalion. These have, hitherto, been separate companies, one or more being at Hong-Kong, Singapore, Ceylon, and Mauritius. Under the new organisation the Hong-Kong battalion will consist of five companies, four being stationed at Hong-Kong and one at Singapore, the other battalion will consist of four companies, two companies being at Ceylon and two at Mauritius. Each battalion is commanded by a major from the Royal Artillery, who has an acting adjutant, the establishment of each company being completed by a captain and two subalterns from the Royal Artillery. The Asiatics for these two battalions are recruited in India.

Owing to the failure of the present mountain gun, the Government of India are about to supersede it for one of greatly superior quality, and the new gun will be issued to mountain batteries with as little delay as possible. The new gun has the same weight as the old one, viz., 400 lbs. It is in two parts and is much more powerful than the weapon it is to supersede, having a calibre of $2\frac{1}{2}$ inches instead of one of $2\frac{1}{2}$ inches, and fires a 10-lb. projectile instead of one of 7 lbs. Cordite will be used instead of black powder. The batteries on the frontier are to be at once re-armed with the new weapon, and the present year will probably see all the mountain batteries similarly equipped.

The Government of India has sanctioned a grant of 100 rupees to each officer gazetted to a Volunteer commission to meet a portion of the expense of providing himself with a uniform and equipment. The officer will be expected to refund the amount should he leave the active list within three years from the date of his appointment.

BULGARIA.—The new Musketry Instructions for the Bulgarian infantry, which consists of two parts, has just appeared. The first part is for the Active Army, and the second part for the Reserve. The musketry training of the Active Army consists of:—

- a. Preparatory shooting.
 - b. Instructional shooting.
 - c. Company firing.
 - d. Winter musketry training.
- a. The preparatory shooting consists of two practices of four rounds each, at the whole figure, at a distance of 200 yards; the first practice with a rifle on a rest, and the second without a rest.
 - b. The instructional shooting consists of seven practices of four rounds each.
 - 1st practice—Standing, at the whole figure, distance 200 yards.
 - 2nd " At the whole figure, distance 900 yards.
 - 3rd " Lying down, at a head target, distance 200 yards.
 - 4th " Lying down, at kneeling figure, distance 900 yards.
 - 5th " At kneeling figure, at which only the head is aimed at, distance 400 yards.

- 6th practice—Two shots kneeling and two lying down, at four kneeling figures at 700 yards.
- 7th „ Two shots kneeling and two lying down, at two whole figures, distance 1,200 yards.
- c. The company firing consists of six practices :—
- 1st practice—Five shots individual firing are allowed, between 300 and 400 yards, at a figure lying down.
- 2nd „ Same as the first, but between 200 and 300 yards, at half a figure.
- 3rd „ Six shots at a head target between 200 and 300 yards.
- 4th „ At from 1,200 to 2,000 yards at three targets, placed at distances one behind the other. This practice is performed by the entire company together, each man being given fifteen shots.

Further shooting is performed by half companies, at targets in column, at from 1,200 to 2,000 yards distance, at which ten volleys are fired. Each infantry soldier is allowed 8 rounds in the preparatory, 28 in the instructional, 61 in the company, and 14 in the winter practices, making a total of 111 rounds. 30 rounds per man are allowed for the Reserve.—*Neue Militärische Blätter*.

FRANCE.—The Autumn Manœuvres of 1899 will be organised and regulated in conformity with the provisions of the *Instruction générale* of the 18th February, 1895 (revised edition, dated 1st March, 1898). The nature and the duration of the manœuvres to be executed will be determined as follows :—

1.—ARMY MANŒUVRES.

The 5th and 9th Corps will execute army manœuvres under the chief command of General Giovanninelli, member of the Superior Council of War. For these manœuvres the 1st Cavalry Division will be attached to the 9th Corps, the 5th Division to the 5th Corps.

2.—INFANTRY DIVISIONAL AND BRIGADE MANŒUVRES.

The other army corps will execute divisional and brigade manœuvres as under :—

Divisional Manœuvres.—The 1st, 2nd, 6th, 7th, 12th, 14th, 15th, 16th, 17th, and 18th Corps (16 days, including going and returning) ; the 20th Corps (12 days, going and returning included).

Brigade Manœuvres.—The 3rd, 4th, 8th, 10th, 11th, and 13th Corps (15 days, going and returning included).

Within the limits of the allotted days for divisional or brigade manœuvres, commanders of army corps have every latitude given them to organise the manœuvres and to group the various elements of the army corps to the best instructional interests.

All the four battalions will take part with their regiments in the manœuvres, with the exception of the 4th Battalions of the 3rd, 4th, 9th, and 20th Corps quartered in Paris, and those of the 6th, 7th, and 20th Corps which garrison fortified stations and the frontier forts.

3.—CAVALRY MANŒUVRES.

Brigade Field Movements.—The 4th, 6th, 7th, 8th, 11th, 12th, 13th, 14th, 15th, 16th, 17th, 18th, and 20th Cavalry Brigades, as well as the brigades of the 3rd and 7th Divisions, will execute brigade field movements for a period of eight days, not including going and returning.

Combined Manœuvres.—These will be executed by the 4th Cavalry Division and a provisional division formed from the 1st, 2nd, and 3rd Brigades under the direction of the Inspector-General of Cavalry.

In addition, the following will take part in the autumn manœuvres, viz. :—

1. All corps brigades.
2. The 1st and 5th Divisions under the conditions specified below.
3. The 2nd Division with the troops of the 20th District.
4. The 6th Division with the troops of the 7th District.

SPECIAL DISPOSITIONS.

The organisation of the manœuvres in the Alps and in the Vosges, as well as those in Algeria and Tunis, will be the subject of special instructions.—*Revue du Cercle Militaire*.

On the 15th February of the current year the artillery reached its full peace strength, which is as follows, viz. :—105 foot, 430 field, 14 mountain, and 52 horse artillery batteries. To these must be added 7 foot and 12 field or mountain batteries stationed in Africa. The total number of batteries is consequently about 620.—*Militär-Wochenblatt*.

The Minister of War has decided on the practice grounds for the shooting to be executed in artillery gunnery schools in 1899. The regiments of the 1st, 2nd, 6th, and 20th Army Corps will go to the camp at Châlons, those of the 3rd Army Corps to Fontainebleau.

The regiments of the 8th and 12th Corps to Braconne, those of the 9th Corps to Poitiers, those of the 10th Corps to Coetquidan (Rennes).

The regiments of the 11th Corps to Mencon (Vannes), those of the 14th Corps and the 36th Regiment of Artillery to Chambaran (Grenoble), and the 16th Regiment to Bourges.

The regiments of the 15th Corps to Garrigues (Nîmes), those of the 16th and 17th Corps to Causse (Castres), those of the 18th Corps to Ger (Castres).

The battalions of foot artillery will go—The 1st and 2nd to Calais, the 3rd, 4th, 5th, 6th, and 7th to the camp at Châlons, the 8th, 9th, and 10th to Pontarlier, the 11th to Chambaran (Grenoble), the 12th to Garrigues (Nîmes), the 14th to the camp at Ger (Tarbes), the 15th to Coetquidan (Rennes), and the 16th to Cercottes (Orleans).

The Army Commission has proposed to the Chamber of Deputies the adoption of a scheme modifying Article 63 of the law of the 15th July, 1889. This scheme authorises the re-engagement of corporals and soldiers of all branches of the service for two, three, or five years during the course of their last year of service, and during the year following their discharge. In the colonial forces every man can re-engage after six months' service. The number of these re-engagements will be fixed each year by decree.—*Revue du Cercle Militaire*.

According to a local Tunisian paper, the following is the composition of the French forces in Algeria and Tunis :—

Four regiments of Zouaves of 4 battalions each (the 5th Battalion of each regiment remaining in France)—total 16 battalions.

Three regiments of Tirailleurs of 6 battalions each, and 1 regiment, the 4th, of 4 battalions—altogether 22 battalions.

Two foreign regiments of 3 battalions each—total 6 battalions.

Five battalions of African Light Infantry, 12 battalions of Infantry of the Line, recently sent from France, which are distributed as follows, viz. :—

The 20th and 126th Regiments in the department of Algiers, the 50th, 101st, 103rd, and 107th Regiments in the department of Oran, the 66th and 125th Regiments in the department of Constantine, and the 27th, 95th, 98th, and 105th Regiments at Tunis.

Thus a total number of 61 battalions, with an effective of about 700 men each, are at the disposal of the general commanding the 19th Army Corps.

The paper, unfortunately, omits any mention of artillery, etc., but from a private letter we learn that several extra batteries have arrived at Tunis, and that a large addition is shortly to be made to the native troops.

The following Military Race Meeting, to be held at Paris, is announced in the *Revue de Cavalerie* for the months of March and April:—

CONCOURS CENTRAL HIPPIQUE.

At Paris. Palais des Machines (Champ de Mars), on Saturday, the 25th March, and Sunday, 16th April, 1899. Military Meeting. Prizes consist of Gold Medals, objets d'art, etc. Prizes reserved for regiments quartered in the following departments:—Calvados, Eure, Eure-et-Loire, Loiret, Manche, Orm, Seine, Seine-et-Marne, Seine-et-Oise, Seine-Inférieure, and Yonne.

Officers' chargers borne on the roll of regiments quartered in the district, and ridden by officers of the Cavalry of the Line, of the Reserve, of Light Cavalry, or special branches of the Service, on the Active List, in uniform and belonging to these regiments.

Prix des Régiments.

1st Section.

Horses ridden by Officers of Cavalry of the Line, of the Reserve, or special branches of the Service. Five prizes value 100frs. each ... 500frs.

2nd Section.

Horses ridden by Officers of Light Cavalry. Five prizes value 100frs. each...500frs.

Total ... 1,000frs.

The President and Committee have the power to transfer prizes from one section to another, according to the number of horses starting.

Prix de Conscription.

Four prizes of 200frs. each ... 800 francs. Four prizes of 100frs. each ... 400frs.

Total ... 1,200frs.

Prizes for Officers' chargers inscribed on the rolls of cavalry regiments, and special branches of the Service stationed in France, ridden by officers on the Active List, in uniform, and belonging to these regiments.

Prix Moncey.—Prix Couplés.

Twice round the course, at least eight obstacles. Gold medals to the value of 1,800frs., of which 1,000frs. is given by the Grands Magazins de la Place Clichy.

Two prizes value 400frs. each ... 800frs. Five prizes value 200frs. each ... 1,000frs.

Total ... 1,800frs.

Chevaux sautant par Quatre.

Four prizes of equal value, consisting of Gold Medals of 100frs. each.

Grands Prix de Paris.

First Day.—Bunches of Ribbons.—Twice round the course, at least ten obstacles.

Second Day.—Prizes.—Only horses that obtained a bunch of ribbons the first day can take part. Three times round the course, at least sixteen obstacles.

1st prize, value 1,500frs.; 2nd prize, 1,000frs.; 3rd prize, 500frs.; 4th prize, 200frs.; 5th prize, 150frs.; 6th prize, 100frs.; 7th prize, 100frs.; 8th prize, 100frs.; 9th prize, 100frs.; 10th prize, 100frs.

Total ... 3,850frs.

Grand total ... 58 prizes, 9,450frs.

GERMANY.—The *Militär-Wochenblatt* publishes an Imperial Order of the 2nd February, relative to the Grand Manœuvres to be held this year. The Order is as follows:—

1. The 13th, 14th, and 15th Army Corps will execute combined manœuvres before the Emperor, in accordance with Article 409 of the Field Service Regulations.

2 a. To each of the above-mentioned army corps a cavalry division will be attached, according to the following "Ordre de Bataille":—

CAVALRY DIVISION A (13TH ARMY CORPS).

26th Cavalry Brigade (25th and 26th Dragoons).

27th Cavalry Brigade (19th and 20th Uhlans).

30th Cavalry Brigade (11th and 15th Uhlans).

A group of Horse Artillery, No. 15, and a bicycle detachment of pioneers of the 15th Army Corps.

CAVALRY DIVISION B (14TH ARMY CORPS).

16th Cavalry Brigade (7th Dragoons and 7th Uhlans).

28th Cavalry Brigade (20th and 21st Dragoons).

33rd Cavalry Brigade (9th and 13th Dragoons).

A group of Horse Artillery, No. 8, and a detachment of pioneers.

CAVALRY DIVISION C (17TH ARMY CORPS).

4th Cavalry Brigade (3rd Regiment of Horse Grenadiers and 12th Dragoons).

9th Cavalry Brigade (4th Dragoons and 12th Uhlans).

36th Cavalry Brigade (1st and 5th Hussars).

A group of Horse Artillery, No. 35.

The Emperor reserves to himself the nomination of commanders to these divisions, and leaves to them the appointment of their staffs.

b. The division of the Guards Cavalry and the cavalry divisions formed in the 13th and 17th Army Corps will execute special cavalry manœuvres in accordance with Section D, second part, of the Field Service Regulations.

c. The cavalry divisions formed in the 13th and 14th Army Corps will take part in the manœuvres executed before the Emperor.

d. The 25th Cavalry Brigade (Grand Duchy of Hesse) will be attached for the entire duration of the manœuvres to the 13th Army Corps. During the manœuvres executed in the presence of the Emperor, the regiments of this brigade will be employed as divisional cavalry.

e. All corps, troops, and staffs attached to the 17th Army Corps will, after the manœuvres, take part in special cavalry manœuvres in accordance with Article 409 of the Field Service Regulations.

3. A balloon section will be attached to the 13th and 14th Army Corps respectively.

4. The time for the manœuvres of the other army corps will be chosen with as much regard as possible to the crops, and they will take place in accordance with the Field Service Regulation, and the regulation for troops on the field of manœuvres.

Brigades of infantry of four battalions will execute their brigade manœuvres in conjunction with another brigade from the army corps. Where special circumstances render it desirable for separate manœuvres for small infantry brigades, the Minister of War will have the power of authorising them on the report of the generals commanding army corps.

5. In the choice of manœuvring grounds and in the execution of manœuvres the question of damage must be taken into consideration. In cases where great damage is likely to occur, the Minister of War will render a report to the Emperor.

6. Cavalry long-distance rides will take place in the 1st, 2nd, 3rd, 5th, 6th, 8th, 14th, and 17th Army Corps, according to instructions of 23rd January, 1879, and in accordance with the Imperial Order of 5th April, 1898.

7. The Grand Manœuvres of the pioneers will take place :—

a. On the Spree and the Oder, between Furstenwald and Furstenberg.

b. On the Rhine between Worms and Oppenheim, and on the Main between Floersheim and Hoechst.

c. In Schleswig on the Alsensund, at the Flensburger inlet, and on the Schey.

The Inspector-General of Engineers and Pioneers will give detailed instructions.

8. All foot troops must have returned to their various garrisons by the 30th September, the last day fixed for the breaking up of manœuvres.

The regulations for the German Colonial Troops have now appeared, and the following are the most important passages taken from them.

The Colonial troops are intended to maintain public order and to secure safety in the African Protectorates; their special mission is to put down the slave trade.

The Governor has at his disposal the military forces of the protectorate. He may employ, as he pleases, the whole or part of the troops for military expeditions.

The officer commanding the troops is responsible for their discipline, instruction, interior economy, organisation, etc. The duties of the other officers are generally similar to those of officers of the Home Army. When the officers of the Colonial Troops are placed at the disposal of the civil administration they must conform to the instructions of the chief of that administration.

German soldiers are always superior to the blacks, whatever rank they may hold. Non-commissioned officers, soldiers, and inferior German *employés* are never subordinate to native officers. The natives, even when on sentry duty cannot give orders to the whites of the Colonial Troops. Nevertheless the latter are compelled to respect the orders which it is the duty of the black sentry to see carried out.

The German recruiting for the Colonial Army is secured by volunteers from the Home Army, who re-engage for a term of years. The period of this re-engagement is two and a half years for East Africa, the Cameroons and Togo, and three years for South-West Africa.

The recruiting for non-commissioned officers for the South-West is carried out as far as possible from nominations made from the corps itself. Candidates for all employments must have not only a good physique but also an irreproachable character (both from a military and from a civil point of view), a good military education, especially in everything concerning service in the field, and in musketry, so as to be able to take the initiative under all circumstances.

Officers coming from the Home Army or the Navy must be in the possession of a good certificate of military fitness, and must have more than three years' service as an officer. They must have a calm and temperate character, a sound judgment, be able to decide without hesitation, know how to treat their subordinates with firmness, be able to exercise the greatest tact towards their superiors, possess a spirit of *camaraderie*, and have no debts. Military doctors must fulfil the same conditions, but may be appointed to the Colonial Troops, irrespective of their length of service.

With regard to the non-commissioned officers, they must have served for at least three years in the Active Army and have held non-commissioned rank for a year.

The recruiting of natives is carried out by enrolment in the protectorates. Enrolments in other districts are submitted for the approbation of the Chancellor of the Empire.

Natives are promoted to different grades and appointed officers by the commanding officer. The emoluments of the officers and the pay of the N.C. officers are as follows:—

Commanding officer	...	...	...	...	15,000 marks.
Captain...	...	...	...	...	12,000 "
1st Lieutenant...	...	...	...	...	9,000 "
Lieutenant	...	...	...	...	7,500 "
Sergeant-major	...	...	...	...	4,500 "
Sergeant	...	...	...	...	3,450 "
Other N.C. officers	...	...	...	...	3,000 "

The officers receive a sum of 15,000 marks when they enter the Colonial Service for their first equipment outlay.

With regard to the non-commissioned officers and private soldiers, they get before their departure for the colonies an indemnity of 50 marks. After the fulfilment of the first period of re-engagement, non-commissioned officers receive 25 marks at the commencement of each year's service. They are, in addition, entitled to 5 marks a month from the day they join the Colonial Forces.—*Revue du Cercle Militaire*.

The *Militär-Zeitung* announces that from the 1st January of the current year a daily evening meal will be provided for the soldier by the military authorities. Before the 1st January, 1897, the German soldier was only given two meals daily, viz., breakfast and dinner. This latter meal took place at 11 o'clock in the day, and from that hour until breakfast the following morning he had nothing to eat except what he was able to provide for himself out of his own pocket. On the 1st January, 1897, however, a step was made in the right direction, and the soldier was given two evening meals in the week, and the further additional meal for the remaining five days has at length been granted, and for the future the German soldier will be served daily with a hot, or at any rate a substantial, evening meal.

ITALY.—The Minister of War has completely modified the regulation for admission to military colleges; and as the special object of these colleges is to prepare future officers for the Italian Army (Active or Reserve), it may be interesting to give, as shortly as possible, the chief provisions of the new regulation.

There are two military colleges, which are established the one at Naples and the other at Rome. The duration of the course of instruction is four years, and the programme followed is that of the 1st, 2nd, 3rd, and 4th Classes of technical institutions (physical and mathematical section). In addition, during the last three years of study, the young men receive a military education, which renders them fit for nomination, on leaving the college, to the rank of sub-lieutenant, to complete establishment in either infantry or cavalry. Those who have successfully followed the four years' course are admitted to the Military School at Modena without examination. Those who are intended for the Military Academy at Turin are compelled to undergo an oral supplementary examination in mathematics, which all candidates have to pass. Besides all pupils, who have obtained the certificate given by the military colleges, are allowed to compete for admission to the Naval Academy at Leghorn. The pupils who, on termination of their studies, relinquish the Military Academy, the Military School, and the Naval Academy, may, before the age of 19, be nominated sub-lieutenants of infantry or cavalry, after a probationary period of four months as sergeants in a regiment. Those of them who aspire to the cavalry must first of all undergo a medical examination and a test showing their amount of proficiency in equitation. Pupils are not taught riding at the military colleges.

For the year 1899-1900 the college at Naples can admit 55 pupils at the first, and 25 for the second, year; the college at Rome 50 pupils for the first, and 15 for the second, year. Candidates are admitted either as a result of examination,

or by the production of certain certificates. If the number of candidates exceeds the number of vacancies, they will be classed according to the number of points they have obtained, either in the special examination they have undergone for admission to the military colleges, or in the examinations undergone to obtain their certificates. In the case of an equality in the number of points, preference will be given to the youngest. Before pupils attain the age of 17 they must enter into a voluntary engagement for service.—*La France Militaire*.

The Minister of War has decided that in future reconnaissance rides will be executed by officers of the cavalry and picked soldiers, to accustom them to fulfil special missions which might be entrusted to them in war-time. These reconnaissances will be undertaken by regiments, and will consist in the accomplishment of a particular mission fixed by a manoeuvre scheme, the development of which will entail a march of from 50 to 125 miles, and will take, according to the distance, one or several days.

These reconnaissances will take place during the summer, and will be executed by subaltern officers once every two years. Captains and officers of superior rank will execute at least one of these reconnaissances before being noted for promotion to higher rank. A special Board under the presidency of the commanding officer should, under the supervision of the general officer commanding the brigade, select a tactical scheme for each subaltern officer, determine the approximate route, fix the day on which the reconnaissance should take place, and finally judge the results obtained. A Board composed of the general commanding the brigade and the commanding officer will fulfil the same functions with regard to captains and officers of superior rank.

The scheme must be given to the officer who is to execute it at the moment of his departure. He should develop it on the march and hand it back on his return. He should attach a map to it so that the condition of the country may be better understood. A reconnaissance which is to last 24 hours should not be for a greater distance than 75 miles. For reconnaissances that must last for several days not more than 55 miles a day should be traversed.

Officers may ride horses their private property, or their chargers. They may be accompanied by a picked soldier. They will be allowed the greatest liberty of action to accomplish their mission, and the Board, in judging the results, will take into account the rational development of the tactical scheme, the state of the horse on its return, and the time employed on the reconnaissance. The decision given by the Board will be inscribed in the officer's record of service. Each year and in each regiment picked soldiers (non-commissioned officers, corporals, and soldiers) will execute individual reconnaissance marches under identical conditions. They will be given a mission similar to one they would receive in time of war, according to their rank and their intelligence. During the days occupied on the march officers will receive money in lieu of transport, the men will receive a separation allowance, and the horses will be rationed on the march.—*La France Militaire*.

The re-organisation of the Italian infantry has shown the Central Musketry School at Parma the necessity for drawing up a new scheme for the training of recruits, which will, above all, have the object of placing them in a position, in a considerably shorter time, being able to take part with the older soldiers in the field. This was so much the more wanted as the domestic relations of the country constantly demanded a further shortening of the training period. Before the introduction of the Regulation of 1892, the recruits were assembled in batches, and frequently kept on the spot for a considerable time, without making any progress. In this way at least three months elapsed before the recruit was fit to take his place in the ranks of his company, besides which no attempt was made to develop his strength. Little was done in the way of gymnastics, bayonet

fighting, and marching, so that although he developed strength and symmetry, the man was not made supple and active, and the initiative spirit was not imparted to him by his instructor.

The new regulation leaves the training of the recruit entirely in the hands of the company commander, in so far that the former must be able to drill with the older soldiers and perform every duty within three months' time in winter and in two months in summer. The commander of the regiment defines the system of training after that period.

The regulation lays special stress on the individual training of the man; in the first few days he must be taught a military demeanour, which gives proof that discipline has taken root in him, and that he has a conception of the honour of the uniform. As a means of help, gymnastics and bayonet fighting are especially recommended; they develop the bodily strength and activity of the man, strengthen and enliven his spirit, and impart to him a great amount of endurance. In addition, the regulation recommends that in spare hours and free days gymnastics should be prosecuted, and should serve as a complement to the military training, but this work in spare time must only be undertaken voluntarily.—*Neue Militärische Blätter.*

The Giornale Militare Ufficiale has recently published a new regulation about the marriage of soldiers; it is as follows:—

Non-commissioned officers may marry as soon as they have eight years' service if they can prove an income of 300 lire from the State. Non-commissioned officers of over twelve years' service, and whose pay amounts annually to 365 lire, may marry without proving any income. Authority to marry may be given to the following, viz.:—

1. *Without Restriction as to Numbers.*—To trumpet-majors, chief armourers, fencing instructors, artillery barrack warders, etc.; in general, to all non-commissioned officers nominated by the Minister.

2. *In the Proportion of One to Two.*—To sergeant-majors of the Royal Carabineers, non-commissioned officers borne on the district list, non-commissioned officers of corps troops, those employed in staff offices, etc.

3. *In the Proportion of One to Three.*—To corporals of the Royal Carabineers, non-commissioned officers at the dépôts, non-commissioned officers at the military schools, etc.

4. *In the Proportion of One to Four.*—To musicians of all ranks.

5. *In the Proportion of One to Five.*—To non-commissioned officers employed at military prisons.

RUSSIA.—The School for Cavalry Officers, founded at St. Petersburg in 1882, and transformed in 1893, has been re-organised by an Imperial Order of the 11th September, 1898, and placed under the immediate authority of the Inspector-General of Cavalry.

The principal change in the *régime* of the school consists in the complete separation, for instructional purposes, of cavalry and Cossack officers.

According to the terms of the order of 1893, the school prepared cavalry officers and officers of Cossacks for the command of squadrons and sotnias, by perfecting their theoretical and practical instruction. The new order has for its object:—

1. To perfect cavalry officers in all matters the knowledge of which is necessary for a cavalry soldier, and to train instructors to superintend the teaching of fencing in troops.

2. To prepare Cossack officers for the command of sotnias and for the duties of superior officers.

Cossack officers continue to be drafted to the school under the old regulations, except as concerns the duration of the course; but it is no longer the same for

cavalry officers. These, under the order of 1893, were selected from amongst those officers who were first to be called to the command of squadrons; they will in future be from amongst lieutenants, or the youngest of the captains of the 2nd Class, who apply for it, and who fulfil the conditions of physical and professional capability. The initiative of selection is left as before to general officers commanding divisions. The officers for instruction are formed into two divisions, viz., the division for cavalry officers (formerly the dragoon division), and the division for Cossack officers. The troopers undergoing a course of instruction, attached formerly to the dragoon division, now form a division apart. The squadron and shoeing school remain without any change. The duration of the course which commences on the 15th October is two years for cavalry officers, and 10½ months for Cossack officers. The troopers for instruction remain for 23 months instead of two years, and those undergoing a shoeing course for 10½ months instead of a year.

The syllabus of work has also been modified; there is one laid down for each division. In that for the division of cavalry officers everything relating to shooting, telegraphy, and the use of explosives has been cut out, in order to give more time to equitation and breaking-in horses, as well as in theoretical as in practical instruction. In the latter riding without saddle and bridle has been introduced, as well as cross-country riding. The syllabus for the division of Cossack officers contains the same matter as formerly, but has been obliged to be curtailed owing to the reduction in the stay of officers of this division at the school.

In the cavalry preference must be given, for the superintendence of instruction of squads, and in the technical instruction of young officers and "youngsters," to officers who have undergone the school course. In the Cossacks these officers are immediately placed in the command of sotnias that may be vacant, or that are commanded by officers who have not passed the school. Cavalry officers have in addition the right to wear a badge. These modifications have brought with them some changes in the establishment of the school. The staff has been increased by a second in command, and by an adjutant instead of an assistant instructor; the musketry instructor has been replaced by an instructor of fencing and of vaulting. The superior officers who superintend each of the courses, viz., two courses for cavalry officers, one course for Cossack officers, and two courses for troopers undergoing instruction, are each assisted by an assistant instructor.

In future, each year, 40 officers from the Guard and Line regiments will be sent to the school, as well as 250 Cossack officers from the Guards or the Line, and 40 troopers. The Horse Artillery will also send a certain number of officers and N.C. officers.—*Revue de Cavalerie*.

According to the *Varchavsky Dnevnik*, the following will be the rates of pay of officers in the Russian Army when the new regulation on the subject is brought out:—

In the Infantry and Cavalry.—Sub-lieutenants, 660 roubles (a rouble being about two shillings); a lieutenant, 720 roubles; a 2nd captain, 840 roubles.

For subaltern officers, holding certain appointments, the pay will be:—Sub-lieutenants, 756 roubles; lieutenants, 816 roubles; and 2nd captains, 936 roubles.

A company commander, who will in future invariably be of the rank of 1st captain, 1,260 roubles; a superior officer not commanding troops (a major), 1,380 roubles; a superior officer commanding a battalion, 1,740 roubles; officer commanding an independent battalion, 2,760 roubles; the commander of a regiment of from 2 to 4 battalions, 3,900 roubles; the commander of a divisional brigade, 4,200 roubles; the commander of a brigade of chasseurs or reserve, 4,800 roubles; the commander of a division, 6,000 roubles; and the commander of an army corps, 9,000 roubles.

In the Artillery.—A 2nd captain receives 1,020 roubles, and a 1st captain 1,200 roubles; a battery commander, 1,980 roubles; a group commander, 2,760 roubles; a brigade commander, 4,200 roubles; and the officer commanding the artillery of an army corps, 6,000 roubles.

In consequence of the reports furnished by the military authorities and by staff officers attached during the summer to cavalry divisions, the officer commanding the troops of the Varsovie district approves in a general order of the steps which have been taken for the development of swimming exercises amongst the cavalry and horse artillery, and gives the following directions on the subject:—

1. It is necessary that as many men and horses as possible should take part in these exercises. With this object, men will be excused from swimming only on account of ill-health and on a doctor's certificate. Only those men whose employments are published in divisional orders will be left in quarters; detachments will not be excused except in extreme cases; as a consequence, the sending out of scouts on a ten days' expedition, as has been the custom in certain corps, should not be tolerated during the period that the swimming exercises take place.

2. The experiences of the dragoon regiments as to the means of transport show that the most practical system, from the point of view of rapidity of construction, of portability, and of facility in finding the materials, is a raft of planks and beams of the type No. 5, laid down in the instructions for swimming and the crossing of water by swimming. Mounted engineers, the cavalry, and horse artillery should be trained to get them together; it is also advisable, during the period of the swimming exercises, to have the materials at hand, prepared in advance.

3. The last exercises in the crossing of a river by swimming should be carried out under a tactical scheme; exercises of this nature have been successfully performed in the 15th Cavalry Division and in the 1st Division of Cossacks of the Don. Commanders of cavalry divisions and brigades and group commanders of horse artillery should exercise just as careful supervision over the instruction in swimming as over other branches of the cavalry and horse artillery service. The appreciation of the success obtained and the conclusions to be drawn from it should be published in the regimental orders of each corps interested.—*La France Militaire*.

The projected Decree regarding the organisation and administration of the Finnish troops contains the following principal regulations, viz.:—

1. The supreme control of the Finnish troops is vested in the Minister of War, so that all matters that may require the sanction of the highest authority, will be notified exclusively by the Minister of War to the Emperor, as is the case with the rest of the Russian Army.

2. The senior officer of the Finland Military District is entrusted with the chief command of the Finnish troops.

3. The senior officer of this military district commands the Finnish troops through the Military District Commission under his control.

4. The staff of the Governor-General of Finland, and the principal officers of the Finnish troops, are abolished.

5. The offices of the official accountants to the Minister of War, those of the principal officers of the Finnish troops, and their assistants, are abolished.

6. Two brigades will be formed from the Finnish troops, and the Finnish Dragoon Regiment is to be assigned to one of them.

7. The officers' ranks of the Finnish troops will be augmented by the importation of officers of Russian extraction.

8. The maintenance of the Finnish troops will be defrayed, as hitherto, by the resources of the country.—*Neue Militärische Blätter*.

The Russian garrison on the Peninsula of Kwang-Tung, on which Port Arthur and Ta-lien-wan are situated, is composed partly of newly-formed units, and partly of troops drawn from the military district of Amur, and is as follows :—

1. Two rifle regiments, Nos. 9 and 11, of the 3rd East Siberian Brigade. Each regiment is made up of two battalions at war strength—altogether four battalions.

2. Six sotnias of Cossacks from Trans-Baikal, which formerly belonged to the Ussuri Cavalry Brigade.

3. One field battery from the 1st East Siberian Artillery Brigade, which will probably be increased by a second battery.

4. Two newly-formed battalions of foot artillery of three companies each (the company is about 300 strong).

In order to strengthen the artillery, men have been drawn from the war-ships stationed at Port Arthur, but to what extent is not definitely known. Under the designation of "troops to guard the Manchurian Railway," a large number of men have been drawn from the Cossacks of the Caucasian Reserve, and these men will shortly be joined by many others of all arms at present serving in Southern Russia. In the Amur District, which would form the base of operations in the Far East in the time of war, there are 38 battalions of infantry, composed as follows :—

10 rifle regiments of 2 battalions each	...	...	20 battalions.
11 ordinary Line battalions	...	...	11 "
1 infantry regiment of 5 battalions for the forts	...	...	5 "
2 reserve cadre battalions	...	...	2 "

These 2 reserve cadre battalions expand in war-time to 10 battalions.

Cavalry.—1 Ussuri cavalry brigade, consisting of the Primorsk Dragoon Regiment (4 squadrons), 1 Trans-Baikal Cossack regiment, and 1 Ussuri sotnia. There are also 2 independent Trans-Baikal Cossack regiments (1 of them newly formed from a foot regiment), and 1 Amur Cossack regiment.

Artillery.—The 1st and 2nd East Siberian Brigades, consisting of 11 batteries (1 being already mentioned under heading 3); these include 2 mountain and 2 mortar batteries, also 3 batteries of the Eastern Siberian Artillery, and 4 Trans-Baikal batteries.

There is 1 sapper and 1 railway battalion. For the forts and coasts there are 6 artillery companies in Vladivostok, 1 in Nikolaievsk, 2 coast artillery commands, 1 fort pioneer company (2 in time of war), 1 fort and 2 coast torpedo companies, and a telegraph detachment. The troops in Central Asia (Turkestan) have not been increased up to the present time. It is, however, thought probable that a universal levy of Mohammadans for voluntary service in the Turkoman cavalry division will be made.—*Militär-Wochenblatt.*

NAVAL AND MILITARY CALENDAR.

FEBRUARY, 1899.

- 2nd (Th.) 2nd Bn. Dorsetshire Regiment arrived at Portsmouth in the "Verona,"
and took over quarters at Shorncliffe.
- 3rd (F.) 1st Bn. West Yorkshire Regiment arrived at Kurrachee in the
"Avoca."
- " " H.M.S. "Theseus" left for Mediterranean.
- 4th (Sat.) 2nd Bn. Highland Light Infantry left Kurrachee for Ceylon in the
"Avoca."
- 10th (F.) 2nd Bn. Highland Light Infantry arrived at Ceylon in the "Avoca."
- " " Presentation of Colours to the 3rd Bn. Royal Fusiliers at Malta by
Lady Grenfell.
- 11th (Sat.) H.M.S. "Edgar" arrived at Plymouth with relieved crews from China.
- " " Launch of torpedo-boat destroyer "Durandal" at Havre for French
Government.
- 12th (S.) 1st Bn. Loyal North Lancashire Regiment left Ceylon in the "Avoca"
for Cape Town.
- 14th (Tu.) H.M.S. "Pylades" commissioned at Chatham.
- 15th (W.) 2nd Bn. Royal Irish Rifles arrived at Southampton on the "Dilwara."
- " " 28th Co. S. Div., R.A., arrived at Southampton on the "Dilwara."
- " " H.M.S. "Gibraltar" arrived at Plymouth from the Mediterranean.
- 16th (Th.) H.M.S. "Aurora" and "Orlando" commissioned at Plymouth and
Portsmouth.
- 17th (F.) The Head Quarters and four companies of the 2nd Bn. King's Own
Yorkshire Light Infantry left India for Mauritius on the "Clive."
- 26th (S.) Launch of torpedo-boat destroyer "Python" from Messrs. Yarrow's
Yard for Austrian Government.
- 28th (T.) H.M.S. "Pylades" left for Australia.

FOREIGN PERIODICALS.

NAVAL.

ARGENTINE REPUBLIC.—*Boletín del Centro Naval*. Buenos Aires: January, 1899.—“Cruise of the Training-ship ‘Sarmiento’ round the world.” “Calculation of the Displacement of a Ship by the Kriloff Method.” “The German Cruiser ‘Geier.’” “Naval Disarmament.” “Regulations for French Naval Officers Travelling by Rail” (*concluded*). “Combustion of Boilers.” “The Straits of Magellan.” “Applied Mechanics.” “Resistance of Material to Ductility.” “The New Naval School.” “Electrical Curiosities.” “Naval Medical Service.” “Metallurgy.”

AUSTRIA-HUNGARY.—*Mittheilungen aus dem Gebiete des Seewesens*. No. 3. Pola and Vienna: March, 1899.—“The Development of the Imperial Navy during the last 50 Years” (*continued*). “The Scientific Cruise of the ‘Pola’ in the Red Sea, 1897-98.” “Successful Gunnery Practice at Sea” (*concluded*).

BRAZIL.—*Revista Marítima Brasileira*. Rio de Janeiro: January, 1899.—“The Navy.” “On Submarine-Boats.” “Treatise on Naval Tactics” (*continued*). “International Rights in Japan” (*continued*).

FRANCE.—*Revue Maritime*. Paris: December, 1898.—“Collisions at Sea: The Saving of the People on board.” “Reform of the Accountant Branch of the Navy.” “The Spanish-American War.” “The Naval Battle at Santiago.” “The Maritime Fisheries.”

January, 1899.—“Introduction to the Study of Naval Tactics.” “Reform of the Accountant Department of the Navy” (*continued*). “Tactics in Great Naval Battles.” “The Torpedo, its Speed, Radius of Action, and Destructive Power.” “The Maritime Fisheries.”

Le Yacht. Paris: 4th February, 1899.—“The Division of Instruction and the School of Gunnery.” “Yachting Notes.” “Yachts of Small Tonnage in Bad Weather” (*continued*). “The Austro-Hungarian Navy.” 11th February.—“French Naval Construction and Public Opinion.” “Yachting Notes.” “The U.S. Battle-ship ‘Maine.’” “Small Yachts in Bad Weather” (*continued*). 18th February.—“The Decree of Re-organisation of the Technical Section.” “Yachting Notes.” “A Visit to Goubet No. 2.” “Small Yachts in Bad Weather” (*continued*). 25th February.—“Brevet of Officers in the Mercantile Marine and the Command of Yachts.” “Yachting Notes.” “The Cruiser Torpedo Dépôt-ship ‘Foudre.’”

Le Moniteur de la Flotte. Paris: 4th February, 1899.—“Submarine-Boats and High Freeboard Ships.” “The French Navy League.” “The Naval *Inscrits* and the Defence of the Coasts.” 11th February.—“The Free Ports.” “Naval Construction in 1898.” “The French Navy League” (*continued*). “Uniformity in New Constructions.” “The Navy in Parliament.” “New Organisation of the *Défense-Mobile* at Corsica.” 18th February.—“Our League.” “The French Navy League.” “The Navy in Parliament.” 25th February.—“M. Félix Faure.” “The German Navy League.” “The Report on the Navy Budget.”

La Marine Française. Paris: 15th February, 1899.—"After the Battle of Santiago." "The Superior School of the Navy." "New Constructions in the United States." "In Tunis." "The Navy, Finances, and Politics." "The First Battle of Lissa." "The Boilers of Ships-of-war." "France in Algeria."

GERMANY.—*Marine Rundschau.* Berlin: March, 1899.—"General and Admiral Count Caprivi—Obituary Notice" (with portrait). "The Navies in 1898." "Modern Ships' Engines." "On Accumulators." "On the Application of Electricity to Ships-of-war" (*concluded*). "The Gun-boat 'Albatross.'" "A Fleet in Being" (*continued*). "Work of the Navy in the Suppression of the Arab Rising in East Africa, 1888-90."

ITALY.—*Rivista Marittima.* Rome: February, 1899.—"Naval Tactics." "The Military Areopagus and the Work of the Fleet." "The Emigration Policy of Italy during the Last Thirty Years." "Engines of Ships-of-war." "On the Calculation of Distances at Sea." "An Autograph of Galileo." "Mahan and Callwell" (*concluded*).

PORTUGAL.—*Revista Portuguesa, Colonial e Marítima.* Lisbon: 20th January, 1899.—"Portugal and France." "Colonial Agriculture" (*continued*). "America of the Future and the Parent Country" (*continued*). "Portuguese and African Affairs" (*continued*). "Portuguese Nyassa" (*continued*). "New Invention for Measuring the Magnetic Movement of the Needle" (*continued*).

20th February.—"Still more about Alliances." "Colonial Agriculture" (*continued*). "Portuguese and African Affairs" (*continued*). "Portuguese Nyassa" (*continued*).

SPAIN.—*Revista General de Marina.* Madrid: February, 1899.—"On the Steering of Torpedo-boats in a Heavy Sea." "Recent Alterations of the Rights and Duties of Belligerents and Neutrals." "The Arsenal of Port Mahon" (*continued*). "An Old Book." "Organisation of the Archives of the Captain-General of Cadiz" (*continued*). "Cruiser Tactics." "English, French, and German Battle-ships." "The Mastery of the Sea."

MILITARY.

AUSTRIA-HUNGARY.—*Militär-Zeitung.* Vienna: 1st February, 1899.—"Independence." "Disarmament?" "The Soldier's Evening Meal." 9th February.—"Important Artillery Questions." "The Second Bureau of General's Staff in the French Army." "Why was the Pursuit by the Prussian Cavalry, after the Battle of Königgrätz, discontinued?" 17th February.—"The Value of the Study of the History of War." "Our-System for the Management of Soldier's Dress." "The Official Report of the Crown Prince of Greece." 25th February.—"Can we Disarm?" "Commissary-General Franz Edler von Candig." "Our Regimental Bands."

Organ der Militär-wissenschaftlichen Vereine. Vienna. January, 1899.—"The Marching of Infantry." "The Pawning of the Zipser Towns" (an episode in Hungarian History).

February, 1899.—"The Modified 9-centimetre Field Gun, M. 75, and the New Organisation of Field Artillery." "The Development in the System of Illumination in the last Ten Years."

Mittheilungen über Gegenstände des Artillerie- und Genie-Wesens. Vienna: February, 1899.—Not yet received.

BELGIUM.—*Bulletin de la Presse et de la Bibliographie Militaires.* Brussels: 15th February, 1899.—"Infantry Feelers and Scouts." "English and Russians in Central Asia" (*continued*). "Study on Infantry Fire" (*continued*). 28th February.

—"The English and Russians in Central Asia" (*continued*). "Foreign Military News." "Study on Infantry Fire" (*continued*).

FRANCE.—*Revue du Cercle Militaire*. Paris: 4th February, 1899.—"Motor Cars and Military Transports in the Field." "Artillery Scouts" (*concluded*). "Report on the War Budget." "The Re-victualling of the Russian Army in the Field" (*continued*). 11th February.—"Note on the Instruction of Military Geography." "Operations on the Line of Communication of an Army in the Field" (with map and sketch). "The Military Year in Germany, Austria, and Italy." 18th February.—"Operations on the Line of Communication of an Army in the Field" (*concluded*). "Small Arms, Model 1895, of Austria-Hungary" (with sketch). "The Military Year in Germany, Austria, and Italy" (*concluded*). 25th February.—"The Military Month." "Cyclists as Combatants." "Officers of the Reserve in Austria." "Seniority of German Officers." "The Re-victualling of the Russian Army in the Field" (*concluded*).

Le Spectateur Militaire. Paris: 1st February, 1899.—"The Truth about the Two Years' Service." "Recollections of an Infantry Marine Officer" (*continued*). "Meteorology as applied to Ballooning" (two maps) (*continued*). "Field Service in the Colonies" (*continued*). 15th February.—"The Truth about the Two Years' Service" (*continued*). "Recollections of an Infantry Marine Officer" (*continued*). "Meteorology as applied to Ballooning" (*concluded*). "Field Service in the Colonies" (*continued*).

Journal des Sciences Militaires. Paris: February, 1899.—"The Eve of Iéna" (*continued*). "The Valley of the Somme from a Military Point of View." "The Inevitable War." "The Great Frederick" (*continued*). "Military Ballooning in France and Abroad." "Reform in Military Jurisdiction." "Scheme for the Regulation of Infantry Manœuvres." "The Austrian War of Succession."

Revue d'Artillerie. Paris: February, 1899.—"The Krupp Field Artillery Matériel." "Essay on the Manner of Preparing the Cadres for Artillery Reconnaissance" (*continued*). "Artillery at the Battle of Omdurman." "Essay on the General Theory of Steels" (*continued*). "Choice and Distribution of Artillery Objectives."

Revue de Cavalerie. Paris: February, 1899.—"Remarks on Promotion." "Spain." "More Troop Instruction." "The Thoroughbred Horse." "Letters of an Artilleryman to a Cavalryman regarding the Regulation on the Manœuvres of Horse Artillery Batteries" (with two sketches). "Study on the Over-riding of Horses" (*concluded*).

Revue du Génie Militaire. Paris: February, 1899.—"Introduction to the Practical Exercises of Engineers in the Field." "Analysis of Extracts from Vauban's Correspondence." "Barrack Accommodation."

Revue du Service de l'Intendance Militaire. Paris: January-February, 1899.—"Microscopic Examination of Corn Flour." "The Heating of Bakers' Ovens." "Enamelling of Kitchen Utensils." "Extracts from Potato Cultivation." "Composition and Use of Maize." "Organisation of the Commissariat Service in the Field in the Russian Army." "Legislation of Expenditure in the Military Service." "Extracts from Recent Publications with regard to Military Administration."

Revue Militaire de l'Étranger. Paris: February, 1899.—"The Grand Russian Imperial Manœuvres of 1898." "Egyptian Expedition to the Soudan in 1898" (*concluded*).

GERMANY.—*Deutsche Heeres-Zeitung*. Berlin: 1st February, 1899.—"The Battles before Belfort, January, 1871, and Historical Truth" (*continued*). "The Operations of the Wheeled Transport at the Manœuvres of the 8th and 13th French Army Corps in August, 1898." "Artillery News from France" (*continued*). 4th

February.—"The Battles before Belfort, January, 1871, and Historical Truth" (*continued*). "Artillery News from France" (*concluded*). "The Japanese Army of To-Day and To-morrow." 8th February.—"The Japanese Army of To-Day and To-Morrow" (*continued*). "The Latest on the Submarine-Boat Question: Their Employment in the Spanish-American War, and the Future Submarine Fleet of France." "The Naval Strength of France." 11th February.—"The Japanese Army of To-Day and To-Morrow" (*concluded*). "The Latest on the Submarine-Boat Question: Their Employment in the Spanish-American War, and the Future Submarine Fleet of France" (*concluded*). "The Re-organisation of the Russian Infantry School of Musketry." 15th February.—"*Maris imperium obtinendum*." "The Military Importance of the Suez Canal." "The Small-bore Projectile in the Spanish-American War." 18th February.—"About Restive Horses." "The Battles before Belfort, January, 1871, and Historical Truth" (*continued*). 22nd February.—"Bruce-Lowe's Numerical System." "The Battle-Ships of France." "The Hamburg Chart Department." 25th February.—"Military Historical Examples from the Franco-German War of 1870-1871." "The Hamburg Chart Department" (*concluded*). "Launching of War-ships in the Year 1898."

Militär- Wochenblatt. Berlin: 1st February, 1899.—"Military Society in Berlin." "The Campaign of 1866 in Bohemia." "My Recollections of the 16th August, 1870." 4th February.—"The Campaign of 1866 in Bohemia" (*concluded*). "On the Military Style." "Exhibition in the Royal Arsenal." 8th February.—"New Mottos." "On the Military Style" (*continued*). "The New Century." 11th February.—"On the Military Style" (*concluded*). "Military News from Russia." "The New Century" (*continued*). 15th February.—"Military Society in Berlin" (*continued*). "General Rohne's new Studies on the Effect of the Infantry Rifle." "*Noblesse oblige*." "Military News from Russia." 18th February.—"The Parisian Commune of 1871." 19th February.—"The New Strengthening of the First Line of the English Army." 22nd February.—"Privy Councillor of War Dr. J. A. Kaupert." "From the Yearly Official Report of the Secretary for War and the Secretary for the Navy of the United States." "The New Organisation of the French War Ministerial Department." 25th February.—"The Cavalry of the First and Second German Army from the 7th to the 15th August, 1870." "Short Instructions for the Carrying-out of Long-distance Rides for Non-commissioned Officers and Men." "Twenty-fifth Anniversary of Conscription in Russia."

Jahrbücher für die deutsche Armee und Marine. Berlin: February, 1899.—"The Anglo-Egyptian Soudan Campaign, 1896-1898." "Critical Examination of Incidents at Sea during the Spanish-American War." "Consumption of Ammunition of Field Artillery since the Introduction of Q.F. Guns, and the Conclusions to be drawn from it." "The Royal Hanoverian Army." "Natural Boundaries." "The Officer as a Lawyer."

Internationale Revue über die gesammten Armeen und Flotten. Dresden: February, 1899.—"Cavalry Divisions and Divisional Cavalry." "Thoughts of an Officer of High Rank on the Two Years' Service." "The British Army." "Promotion of Officers in the Russian Army." "Russian Forces in Asia." "The Roumanian Corps of Officers." "From the History of the Manufacture of Arms." "Admiral Makaroff's Opinion about Ironclad Vessels."

Neue Militärische Blätter. Berlin: February, 1899.—"About the Turkish Dispositions at Plevna (with two maps). "On the employment of Cavalry in the Battles and Skirmishes of the Campaign of 1899 in South Germany." "The Regiments of the Royal Prussian Army of the Year 1806." "Criminal Policy and Means of Defence." "From the Official Report of the Crown Prince Constantine on the Events of the War in Thessaly in the Year 1897." "Kiao-Chau."

ITALY.—*Rivista di Artiglieria e Genio*. Rome: February, 1899.—"A. Krupp—Biographical Notice" (with portrait). "Some Graphic Tables for Correcting

Errors due to Guns and Targets being on Different Levels." "Reminiscences of the Earthquake at Rieti." "Revolving and Automatic Pistols." "Deafness of Gunners." "Some Contracts for the Supply of Arms in the 17th Century." "The Siege of Strasburg in 1870" (*concluded*). "Some Studies on the Calculation of Probabilities in the Fire of a Battery."

Rivista Militare Italiana. Rome: 1st February, 1899.—"The Lower Po to the Isonzo: A Critical Study of the Second Part of the Campaign of 1866 in Italy, with special reference to the Passage of the Po and the March of an Expeditionary Corps from the Lower Po to Isonzo." "On the Instruction of Recruits." "The Battle of the Three Arms" (*concluded*). "Politico-Military Notes." 16th February.—"The Local Resources of Provisions." "The Lower Po to the Isonzo" (*continued*). "On the Treatment of Balloonists in War." "The Admirals of the Fleets at Crete." "The Small War of 1870-71" (*concluded*). "The Imperial Captain Cinuzzi and his Works." "Politico-Military Notes."

RUSSIA.—*Voïennyi Sbornik*. January, 1899.—"War," by Clausewitz." "The Defence of St. Petersburg in 1704-1705." "Remarks on the Subject of the Article 'The Expedition of Akhal-Teke in 1879 (October, 1898).'" "The Obligations of Politics with regard to Strategy." "Discipline as Applied to Facts." "The Proposed Regulations for Infantry, and Instructions for Infantry in Action" (*continued*). "The Feeding of Troops in War." "The Instruction of Horse Artillery with regard to Cavalry." "Outdoor Gymnastics and its place in Military Instruction." "Winter under Canvas." "Military Colleges in Austria-Hungary." "Sketch of the Insurrections on the North-West Frontier of India in 1897." "Increase in the Pay of Officers." "Ideas circulated on the Subject of the Decrease in Price of Officers' Uniform." "Ideas circulated on the Subject of the Marriage of Officers." "Military Review of the Year 1898 regarding the Armies of Western Europe."

February, 1899.—"War" (*continued*). "The Russian Army in the Caucasus and in Asia." "The Defence of St. Petersburg in 1704-1705" (*concluded*). "The Obligations of Politics with regard to Strategy" (*concluded*). "The Infantry Regulations of 1897." "Defence Organisation." "Foot Drill in Field Batteries." "Blockade of Fortified Places and Entrenched Camps." "Exercises in Manual Labour with regard to the Physical Education of Pupils of the Cadet Corps." "On the Question of Non-commissioned Officers." "On the Subject of Limitation of Age of Officers." "Sketch of the Insurrections on the North-West Frontier of India in 1897" (*continued*). "The New Regulations for Admission to the Corps of Cadets." "Furlough Regulations in the Prussian Army."

SPAIN.—*Memorial de Ingenieros del Ejército*. Madrid: January, 1899.—"The Practical School of the 4th Regiment of Sappers and Miners in 1897-98." "Siemens-Halske New Field-Firing Battery." "Regulations for Parks of Engineers." "Aluminium as a Conductor of Electricity."

Revista Técnica de Infantería y Caballería. Madrid: 1st February, 1899.—"Promotion and Pay" (*continued*). "The Levelling of Ground with the Klipsometer." "Independent Cavalry before Water-Courses" (*continued*). "Infantry: Proposed Tactical Instruction." 15th February.—"Infantry Schools of Musketry, in Spain and Abroad." "Independent Cavalry before Water-Courses." "Infantry: Proposed Tactical Instruction" (*continued*). "The Supply of Ammunition to Infantry in a Modern Battle" (*continued*). "Napoleon, General-in-Chief."

SWITZERLAND.—*Revue Militaire Suisse*. Lausanne: February, 1899.—"For the Manœuvres." "Corps Artillery." "The Grand Prussian Staff." "Report on the Firing at the Krupp Works." "Exercise Marches for Officers."

NOTICES OF BOOKS.

Provisioning Armies in the Field. By Colonel G. A. FURSE, C.B. 8vo. London, 1898.

Neither the author nor students of the art of war will have any cause to regret that this valuable compilation, relating to the methods employed in the feeding of Armies, has not fallen into other hands. What Colonel Furse lacks in practical experience of this particular branch of the Service has been met by a judicious arrangement of information affecting various campaigns, which demonstrate almost every phase of this complex and difficult study. A careful perusal and consideration of this interesting book cannot fail to impart most useful information, and will afford subject-matter for study to even the most experienced officers engaged in these particular duties. To the officers of the Army generally, it will not only impart knowledge, but will give them a truer conception of the intricacies of the Supply Service, and will unquestionably fit them better to give efficient assistance to that department in the field. In these days every officer endeavours to secure as much information about, and as much knowledge of, other branches of the Service as he can find time to bestow upon them; it is patent to all that a commander is not of much use unless he has a very intimate acquaintance with the whole machinery of war, consequently officers are forced to study throughout their service if they are ambitious of advancement. It is for that reason that officers are recommended the study of this and other kindred works.

Colonel Furse complains of the reticence of military historians; without exception they almost ignore the subject of Supply, fearing to tax the patience of their readers with figures and a somewhat dry subject. He complains, therefore, that facts illustrative of the methods employed are few; however, he has made excellent use of those which were procurable. One would hardly have imagined that it was now necessary to establish the importance of any part of our great fighting machine, the fact of its existence practically demonstrates its absolute necessity; Colonel Furse has, however, shown beyond dispute the vital importance of the Supply and Transport Services to every Army, whether in the field, in camp, or quarters. There is no better way of acquiring a fairly sound knowledge of the art of provisioning an army in the field than by a careful study of this and other similar works; furthermore, the experience so gained of the *modus operandi* employed in other campaigns will, as the author suggests, guard an officer against the commission of like errors, or encourage him when adopting their successful methods. In no branch of the Service do circumstances so much affect preconceived plans. A supply officer must be an opportunist. Undoubtedly close study is required, but books like that under notice are needed.

Nine chapters are devoted to the progress of the Supply and Transport Services from the middle of the seventeenth to the beginning of the nineteenth century. He demonstrates clearly that the greatest commanders of those times took a great interest, and devoted much of their time, to the supply and transport of their victorious armies. He attaches much importance to the humane treatment of the inhabitants of an invaded country, and proves that the atrocious conduct of the French soldiery was in the main responsible for the retaliatory measures adopted by the peasantry during their campaigns in the Peninsula and Russia. He gives graphic details of the hardships endured by Napoleon's Army during its advance on Moscow, which he attributes to the absence of prevision on the part of this great commander, who was so intent on carrying out his designs, that he refused to give his commissariat time to effect proper arrangements. The

retreat was undertaken hurriedly and without adequate preparation, and resulted naturally in the destruction of almost the entire French Army. The circumstances connected with this short but disastrous campaign are replete with information for the military student, who will find no fuller recorded details of a failure of both the Supply and Transport Services of any army in the field. The Peninsular War affords a capital field for the study of the Supply and Transport Services, particularly if taken conjointly with the despatches. Some students may think that such campaigns are out of date; others hold a different opinion, for the simple reason that neither the people, the products, the transport facilities, nor the countries themselves change to any appreciable extent, and that experience previously gained will never be without value in any future operations undertaken in the same localities.

In his account of the staff and departmental collapse in the Crimea, Colonel Furse only follows the fashion when he condemns Commissary-General Filder for "want of prevision and lack of courage to assume responsibilities." Colonel Furse confirms an opinion, which was expressed in a magazine article last August, to the effect that a serious blunder was committed when Varna was abandoned as a base for the Supply and Transport Services. For this he holds the General Staff responsible, not the Commissariat. It is a matter of opinion if the Commissary-General individually was or was not deserving of the scathing censures heaped upon him during and after that campaign. His officers were certainly, with few exceptions, inexperienced in field service, and he had no subordinate staff. Without any transport organisation and without magazines, Commissary-General Filder was, without any warning, pitchforked on to the barren Crimean uplands, and was expected to accomplish what was next to impossible. However, by dint of hard work and indomitable perseverance the much abused Commissariat managed to drag the Army through a very trying campaign, notwithstanding the persistent refusal of the Treasury to comply with the timely requisitions sent from the seat of war. After Mr. Filder had collected as much transport as the French intendant had secured for their larger Army, he saw it dwindle rapidly, in consequence of the bad roads and the heavy work entailed in the transport of the heavy guns and ammunition needed for the bombardment of Sebastopol. The Commissary-General could not be held blameworthy for either the badness of the road, for the steep ascent to the plateau, or for the distance of the camps from Balaklava. These were the primary causes of the destruction of his transport, the failure of which resulted in the great mortality which threatened to destroy our Army during the winter of 1854-55. The last official statement made upon this subject should have completely exonerated Mr. Filder. The Board of General Officers expressed the following opinion:—"Mr. Filder gave every information, and that it is not for the authorities in England to judge of the expediency of complying with the requisition of the Commissary-General, whose demands are based on experience gained on the spot." That opinion, expressed in few words, describes truthfully the way in which Mr. Filder's timely demands were treated by the Treasury. Colonel Furse writes, "it is inconceivable how advantage was not taken of the resources of the markets of Trebizond, Constantinople, and Smyrna." It is a fact that by December, 1854, the Commissariat had collected 4,000 head of slaughter cattle at Constantinople, 2,000 at Smyrna, 1,000 at Sinope, and 1,000 at Samsorn, besides large quantities of chopped straw, barley, charcoal, and fresh vegetables, for which the Admiralty agent was not able to procure sufficient sea transport.

The particulars given of the Commissariat work done during the Indian Mutiny, the American Civil War, and the Franco-German War, is full of interest and instruction. The author has suggested many points, which, if followed out, will give ample scope to the student of this branch of the art of war. During the operations in India, the Commissariat received invaluable aid from the well-affected portion of the civil population, which the author attributes to the "rooted respect

for the department in the native mind." His description of the American and Franco-German wars affords the student an opportunity for studying the utilisation of rivers, canals, railways, and telegraph lines with a large army in the field.

The campaigns of Abyssinia, Ashantee, and the Nile will demonstrate how the supplies may be obtained in non-productive countries, and how physical and climatic difficulties may be combated and overcome. Had the initial suggestion of Sir Robert Napier been adopted, the organisation of a coolie corps, probably hundreds of thousands would have been saved in the cost of the expedition. His intention was, it is believed, to employ Chinese carriers. Had such a corps been employed, the stores and supplies needed for the expedition would have been accumulated a month earlier, at the least, at Jenafé; and an enormous outlay in the purchase of camels and mules in so great numbers would have been avoided, as also much of the huge initial losses in these animals occasioned by the absence of proper supervision and of sufficient attendants. The transportation could have commenced earlier, and would naturally have been completed sooner. As it was, the Army was overtaken by the rainy season before the operations were entirely completed. The following are the chief advantages of employing Chinese coolies: they are strong, patient, persevering, and are not inclined to desertion in a foreign land. A Chinaman will carry about half a mule's load, his food is less costly and less bulky, and the cost of getting him to the seat of war is small as compared with that of a mule; furthermore, he is easily replaced, and his loss represents no actual pecuniary damage.

The chapter on various systems of provisioning is replete with suggestions and information, and is the outcome of a lifelong painstaking observation of cause and effect in regard to supply operations in time of war. His description of the difficulties attending the advance of an army corps are certainly not exaggerated. But his proposal that troops should in a measure provide for themselves was not found to work well in the Peninsula, where the indiscriminate issue of *vales* led to much confusion and misunderstanding; it would perhaps be preferable that all officers and men so employed should act entirely under the direction of the senior supply officer. It is doubtful if magazines should now be considered obsolete. War naturally reduces the ordinary productions, and for that reason alone, it is absolutely essential that the deficit should be made good by accumulations; more particularly so is it the case in this country, which depends upon other nations for more than one-half its food supply. Colonel Furse makes a strong point of the transportation of inferior supplies; enormous losses result from the want of sufficient care in this regard in the field; officers and subordinates naturally desire to be rid of inferior stuff, and may be forgiven for allowing it to pass on unnoticed. The fault rests with the officer who, through negligence or want of knowledge, originally accepts the supply. Cases have occurred of supplies being condemned after the carriage had augmented their cost four- or five-fold. The last chapter is devoted to the consideration of the ration. The author is undoubtedly right in thinking that there is ample room for improvement in the soldier's ration, and no doubt if more attention were given to climatic conditions and the existing food consumed by the inhabitants of the country in which the Army is serving, supplies would be procured with greater facility, and the health of the troops would be much improved.

It may be added, in conclusion, that Colonel Furse has provided ample food for reflection by the officers of the Army generally, and it is to be hoped that his efforts in this direction may act as a stimulus to our military historian, who perhaps may be induced to give more time and attention to this highly important branch of the art of war.

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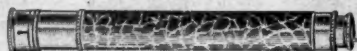
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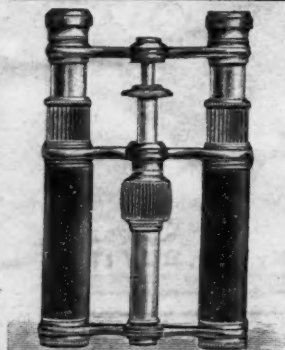
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